QUANTITIES

BY

BANISTER FLETCHER

NINTH EDITION

QUANTITIES

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With Special Chapters on

CUBING, PRICED SCHEDULES, GROUPING, REPAIRS, METHODS ADOPTED IN THE NORTH, THE LAW, AND COMPLETE EXAMPLES OF TAKING-OFF, ABSTRACTING, AND BILLING

WITH NUMEROUS FORMULÆ, RULES, AND MEMORANDA

BY

PROFESSOR BANISTER FLETCHER,

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NINTH EDITION, REVISED AND ENLARGED

LONDON

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MADE AND PRINTED IN GREAT BRITAIN

PREFACE
TO
THE NINTH EDITION

In carrying out the revision of the ninth edition of this work of my father, the late Professor Banister Fletcher, and my brother, the late Major H. Phillips Fletcher, advantage has been taken of the opportunity to delete references as to materials and processes which had become obsolete, and to insert various additional notes.

As, however, in spite of more stabilised conditions in the building trade, it can scarcely be said to have settled down to normal working, it has been considered best not to attempt any very extensive remodelling of the book.

The former L.C.C. tables of wages and hours have been replaced by specially compiled notes giving the rates for labour at the end of 1922, with an additional note on the fluctuations in the prices of the chief building materials from 1914 to the same period, as well as a memorandum of the wage variations, which will probably be subject to further adjustment.

It has, however, been felt advisable to retain for the present the Tables of Constants on page 401, and not to make any alteration therein.

It is well known that the disturbed state of the labour market after the war resulted in decreased efficiency, and consequent diminution of output, which made all pre-war bases of reckoning entirely untrustworthy. This diminution was reckoned by some authorities, with probable correctness, at the height of the rise, as averaging at least 20 per cent. in comparison with pre-war output, and it was a factor which had to be taken into account, in addition to the allowance for shorter hours and higher wages. There is no doubt that the reduction of output is likely to disappear altogether in

course of time, but for the present a small allowance should be reckoned under this head, varying, of course, in different districts according to the operation of local conditions.

It has, therefore, been thought advisable to keep the constants as they are at present, any temporary adjustments being made from the table by a method of percentaging.

When this book was going to press the publication was announced of the "Standard Measurement of Building Works," authorised by agreement between the Surveyors' Institution, the Quantity Surveyors' Association (now incorporated with the Surveyors' Institution), the National Federation of Building Trades Employers of Great Britain and Ireland, and the Institute of Builders. In the main, the methods advocated in that book will be found to agree with the standard methods laid down in this work; deviations in matters of detail have, as far as possible, been noted in the chapters affected.

I think it well to draw attention to this new work, which is primarily intended to prevent disagreement and settle disputes arising from diverse methods of measuring. It is founded on the system as practised by several of the leading London quantity surveyors, and appears a laudable effort to obtain uniformity of method.

It is not intended, I understand, that the methods advocated in the above-named work should apply to the northern parts of the kingdom and elsewhere where settled systems prevail.

I have to thank several quantity surveyors and professional friends for helpful suggestions and assistance in the revision for the present edition, and notes of this type would be welcomed at all times.

BANISTER FLETCHER, Knt.

1 KING'S BENCH WALK, E.C. 4.
March, 1923.

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QUANTITIES

CHAPTER I

INTRODUCTORY

IT is not intended in the present work to enter into any questions of design or different methods of construction, or even to mention them, as the desire of the authors is to confine themselves exclusively to the subject of quantities and their valuation. Their endeavour has been to present practical information concisely, and in a manner similar, as far as the subject permits, to the authors' other works.

The following chapters, whilst entering as fully into the subjects as seems needful, have been condensed as much as possible, so as to do away with any unnecessary reading which tires the student, whilst imparting but little information.

The various items are scheduled under their several trades, and in showing how the works are measured it may be observed that the operations have been based upon practical experience. With this object in view it is hoped that the subject has been fairly elucidated. Differences exist amongst quantity surveyors in their methods of measurement of the various classes of work. Some of these differences arise from surveyors adopting their own peculiar methods, and some again from a lack of experience and an imperfect knowledge. It must also be borne in mind that the admeasurement of artificers' work is not confined to our profession. Many builders in tendering for works where the quantities are not supplied, take-off their own rather than incur the expense of employing a surveyor. Builders do not, as a rule, enter so minutely into the subject as surveyors; they measure the work more fully, which allows for their omission of details.

Before proceeding further let us briefly mention the essential qualifications which the student must possess before he is properly fitted to carry out the instructions contained in the following chapters.

They may be summarised as follows :—

Firstly. A thorough knowledge of Building Construction.

Secondly. An acquaintance with the ordinary rules of mensuration.

Thirdly. A knowledge of the customs in each trade.

Fourthly. A certain amount of tact and patience to grasp the subject so as to be able to apply the admeasurement to any description of works.

Fifthly. Accuracy and energy.

With respect to the first of these items, it is absolutely necessary that the student should be thoroughly acquainted with the building trades, and that such acquaintance to be of effect should be practical and not simply theoretical. Unless this is the case, he will find himself beset with difficulties, which, if not insurmountable, will greatly retard the successful accomplishment of his task. This will more clearly be presented to his mind when measuring from working drawings, where much more care and knowledge are required than where measuring from the building. The other qualifications are equally essential to enable the student to take off quantities successfully ; the second is what most people of an ordinary amount of intelligence possess ; but the last two items are worthy of special attention by all those who wish to attain to the goal of success.

In measuring from the building the mode of procedure is the same as where measuring from the drawings, the only difference being that the latter requires more care.

The operations necessary to produce the schedule, or bills of quantities, from which builders make up their tenders, are :

Taking-off, by which is meant the measurement or taking off of the several items and dimensions from the drawings.

Squaring, by which the various dimensions are prepared for abstracting.

Abstracting, that is classifying and arranging the several works from the dimensions, so as to arrive at the total of each kind. The items should be arranged in the abstract in the same order in which they are to come in the Bill.

Billing, that is bringing the quantities with their descriptions from the abstract and arranging them in the form of bills, which are supplied to the various contractors to enable them to prepare their estimates.

Another operation is necessary where the work has not been carried out in its entirety according to the drawings and specifications from which the bills of quantities were prepared, viz. **measuring up**, by which is meant taking the dimensions from the building, and **extras and omissions** are treated in this way. The latter are works which, whilst included in the bills of quantities, have not been executed, and consequently have to be deducted.

Before commencing to take off quantities, the drawings and specification should be carefully compared to detect errors and discrepancies. If the specification has not been previously prepared notes should be jotted down in a book as the quantities are taken off.

All drawings should be traced and figured in red ink, with the floor levels marked through in coloured ink and the heights marked thereon. Notes should be made on the tracings as the quantities are taken-off, and a note-book should also be kept for each job and all queries, etc., entered therein.

The dimensions are generally taken-off and entered in a measuring book, or on paper ruled for the purpose. Over leaf is a specimen page of a measuring book, or taking-off sheet, and the ordinary names and purposes of the columns are as follows:—

The column marked T is the **timesing column**, D is the **dimension column**. The result of squaring or cubing the dimensions entered in column D is entered in S, the **squaring column**. The fourth is the **description column**, the right hand side of which is called the **waste**. In cases where there are several dimensions of the same character, as, for

SPECIMEN OF MEASURING-BOOK

T	D	S		*Waste.*
			Dig and cart away in clay soil [formation of walls]	
	32·2			
	22·2			
	1·6	1070·0	Gross length of building	30′·0″
			3 courses of foots = 7″	
			projection of concrete = 6	
			1·1	
			(for both ends) 2	2′·2″
				32′·2″
			Gross width of building	20′·0″
			3 courses of foots and concrete as to end = 1·1	
			2	2′·2″
				22′·2″
			20·0 (width of building)	
			2/1·1½ = 2·3 (thickness of outside walls)	
			17·9 (net length of end walls)	
			30·0 front wall (gross)	
			2/ 47·9 = 95·6 total length of four walls	
	95·6			
	3·3			
	2·6	775·11	Ditto to trenches part return wheel fill in and ram (walls collected)	
	95·6			
	3·3			
	1·6	465·7	Concrete as described	
	95·6			
	9	71·8	2½ B. footings (averaged)	
	95·6			
	1·2	111·5	Damp-proof course of double course of slates in cement.	
	95·4			
	12·0	1144·0	1½ B. wall to top of plate (ground floor)	
	95·4			
	18·0	1716·0	1 B. add to roof plate	

SPECIMEN OF MEASURING-BOOK—*continued.*

T	D	S		*Waste.*
	3·6			
	7·0	24·6	1 B. ddt. entrance door	
	4·3			
	7·3	31·0	½ „ „	
3/	3·0			
	6·0	54·0	½ B. ddt. windows (ground floor)	
3/	3·9			
	6·3	70·4	1 „ „ „	
2/3	2·6			
	5·6	82·6	½ „ „ (1st and 2nd floor)	
2/3	3·3			
	5·9	112·2	½ „ „ „ „	

example, walls of the same height and thickness, it is undesirable to make a separate entry for each, and they are *collected* at the right-hand side of the book, this column being technically known as *waste* (see item No. 2, p. 4, and how it is obtained). The several dimensions are then cast up, and the sum, or total, placed as shown in the column D, as a collection of the same depth and description. In the illustration given we have a rectangular building, 30 feet × 20 feet outside dimensions of walls, with all walls of the same height and thickness; they are therefore added together, and the one dimension of the total length saves the trouble of making two entries of the same kind.* It is always advisable to *collect* the work as much as possible, as it materially shortens the labour; but care must be taken to state, in addition to the description of the work, the particular situation of it, as by this means the

* In Chapters II. and III. the method of obtaining the dimensions in the example here given is explained.

surveyor can the more readily find a dimension at any future time, should it be required. Where it is almost a physical impossibility to measure a particular item such as underpinning, an approximate amount is put in the bill and such amount is adjusted at the completion of the contract. Such item should be marked "provisional."

In taking-off, always make a uniform starting point, and adopt a general course throughout. By this means it will be much easier to find any required dimension hereafter. It is customary to commence at the left-hand corner of the building, and from thence work round to the right hand. Also adopt one method of taking the dimensions, thus: in internal dimensions in every trade, take floor by floor, commencing at the left as before. Take the length first; secondly, the breadth or width; and lastly, the depth or thickness.

Make as many *finger-posts* in the "taking-off" as possible, so that when referring back the meaning of each item may be clear. In describing an item "as before" refer to the folio, e.g. $2/\left|\begin{matrix}3{\cdot}0\\7{\cdot}0\end{matrix}\right|42{\cdot}0\,|$ 2″ six-panel door, a. b. (see fo. 92).

It has so often been found that squaring is a stumbling block to the student, that it is felt it will not be out of place to give a few remarks thereon. Practice will show the student many ready methods by which dimensions containing combinations of figures apparently requiring much labour to determine may be solved in a very rapid manner.

In squaring, the student will find that many items have figures at the side, thus $2/\left|\begin{matrix}4{\cdot}0\\3{\cdot}0\end{matrix}\right.$, which is called "timesing,"* the result of 4 feet × 3 feet being × by 2. Another form of timesing is thus, 7·7/, which would indicate 7 + 7, or 14; this form is called dotting on and is used where items occur which are exactly similar to others already taken and timesed.

The dimensions should be squared or cubed in red ink, and be checked and ticked in black.

---

* See page 3.

In squaring and cubing remember that

Feet × by feet produce feet.
„ × „ inches „ inches.
„ × „ parts „ parts.

A few examples of the various forms met with are now given.

		12′
		$3\frac{1}{2}$
12·0		
3·6		36
——	42·0	6
		——
		42·0

12·0		
3		Here we have 3″ as $\frac{1}{4}$ of 1′, and $\frac{1}{4}$ of 12 = 3′.
——	3·0	
2/ 12·0		
3		Here multiply by the timesing, and we have 6″ × 12′ = 72″ = 6′, or 6″ = $\frac{1}{2}$ $\frac{1}{2}$ of 12′ = 6′.
——	6·0	
1·2/ 12·0		Here we have a multiplying number of 1 + 2 =
3		3 times.
——	9·0	3 × 3″ = 9″ × 12′ = 108″ or 9′.
		Here we have 7 + 7 = 14 × 2 = 28.
7·7/2/ 12·0		Now 3″ × 12′ = 3′ × 28′ = 84′,
3		or 3″ × 12′ = 3′ × (7 + 7 × 2) = 84·0.
——	84·0	

Figures that will multiply clear of fractions may be dealt with in a variety of ways.

As an example

		Here we have 3′ 8″ × 6′ = 22·0
6·3		3′ 8″ = 44″
3·8		3″ = $\frac{1}{4}$ of a foot 44″ ÷ 4 = 11
——	22·11	——
		22·11

Next we have cubical dimensions, thus :—

6·0		
3·0		A simple multiplication of 3 figures ;
4·0		
——	72·0	

or where part of the combination contains feet and inches, as

Here × by the feet dimension (3′), so as to obtain an even dimension (without inches).

6·3
3·4
3·0
—— 62·6

We have 3′ 4″ × 3/ = 10′·0″
then we have 6·3 = 6¼

10·0 or 10
—— ——
62·6 62·6

Then again we have cubical dimensions, thus :—

Where there are 2 figures of inches that will make 12, as 8″ 6″
1½″ 2″
— = 12″ — = 12‴ and so on, then take the 12 as parts, thus :—

8·0
4
3
—— 8″

8′ 0″
12‴
——
96‴ = 8″

2/2/8·0
9
1½
—— 3·0

Here we have a multiplier of 4.
Then 4 times 9″ = 36″ = 3′
3·0 × 8·0 = 24′
1½″ = ⅛th of a foot. 24′ ÷ 8 = 3′.

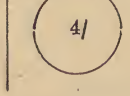
It will thus be seen that great liberty may be taken with the figures, so as to save time, and the whole of the foregoing may easily be worked out as a mental calculation.

Another form in which dimensions occur is when measuring triangular framing as a spandrel to a staircase. Here the full height is taken and the extreme length, and this is halved thus :—

½/ 7·0
9·0
—— 31·6

7 × 9 = 63′ ÷ 2 = 31′ 6″.
(spandrel framing 1st floor).

Another form is where the area of a circular opening is required, as

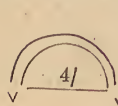


12·7

Here the area is obtained by × the square of the radius by 3·1416.* In this case
2 × 2 = 4 × 3·1416 = 12·5664
(mosaic paving to marble fountain).

* See page 386.

Again, where the cutting is required to the circumference, and we have:



6·28	Here the circumference is obtained by × the diameter by 3·1416 and dividing by two, as the example is a semicircle, and we have 12·56 circumference of a 4-feet circle ÷ by 2 = 6·28.

Another form is where numbers occur as thus :—

	2	2

These should be taken out into super. column thus; and where they are timesed should, of course, be multiplied by the timesing number.

2/	8	16

The student will find on page 387 tables giving the areas and circumferences of circles.

In cutting out the items for abstracting, care should be taken that the items are so cut through that it is quite clear at which item the line stops; and where two or more figures of the same are added together, cut them through, as example.

	5·0		
	2·0	10·0	
	7·0		
	3·6	24·6	
	11·0		34·6
	5·0	54·0	
2/	8·6		
	2·0	34·0	

The foregoing examples, it is believed, will have sufficiently explained the method of squaring, so that the student will now be able to improve his knowledge by practice.

In the following chapters it is intended, firstly, to show how the several works are measured, and at the conclusion of each trade to give the order of abstracting and bringing the quantities into the bill. Many surveyors have their own method of abstracting, but it is thought that the method shown is perhaps the most desirable.

In practice most surveyors of experience get into the habit of "grouping" items when taking-off the quantities, and where the necessary knowledge is present this is no doubt a great convenience, and is explained in Chapter XX.

This method consists in taking-off all the trade for particular items at the same operation. With regard to openings (such as doors, windows, &c.), it is believed that this method is distinctly desirable, thus the brickwork being previously measured up to the full height, the deductions are noted as each opening is taken off. (Examples of this method are given on pages 204 and 207.) It is believed that the system of taking-off by "trades" as described in the following chapters, and as set out in the example at the end of this book, is the best for the student to learn from, as it is less complicated and it is perhaps more useful for reference. As, however, he becomes proficient in each trade, he can begin to "group" his items as he may find convenient. "Grouping" renders the abstracting more troublesome, but it is very handy if one portion of a building or a wing is afterwards omitted, as one can then strike out the items *en bloc* instead of hunting through each separate trade.

Six examples embracing this method are shown in Chapter XX., page 202.

CHAPTER II

EXCAVATOR

COMMENCE with the excavation of the surface where necessary, as for basement or sunk stories, taking the net dimensions of length, breadth, and depth of the digging required. Where the excavation does not exceed 6 feet in depth, it is described as digging and throwing out only, but where beyond that the depth must be stated and taken separately; in addition, specify whether the earth is to be wheeled and spread, or carted away. If wheeled above 20 yards, how far, and if carted away, it is advisable also to state the distance, the cost varying according to the same, though this is seldom done. Give the nature of the soil, as the labour is regulated by it.

Trenches must be measured and kept separate from the general excavation, and described as "digging to trenches, part filled-in and rammed," the filling-in and ramming taking place after the foundations are in. Some surveyors, however, make a separate item of these latter, in which case the item for the digging is placed with the general excavation. Where there is no concrete, an allowance of 6 inches on either side of the bottom course of footings is made, to give the bricklayers room to work in; but where concrete is provided to be used in foundations, allow for only the width of the concrete. Thus, where the bottom of footings is three bricks, or 2 feet 3 inches wide, and no concrete is provided to be placed under the footings, the width taken for excavation would be 3 feet 3 inches.

Strutting.—When the excavation is deep, and the soil loose, it will require to be strutted, to prevent the ground from falling in. This is measured at per yard run (see Table I.),

giving the depth and width of the trench, and is described as "strutting and planking to perpendicular excavation." This is generally taken when the excavations exceed 4 feet in depth.

Piling.—Where piling is used, it will be necessary to state the number of the piles, with the length in feet, and scantling of each. Then measure the quantity of planking required to be spiked to the face of the piles. For the labour of driving take the number, and state the distance each is driven into the ground: also number the ringing, pointing, and shoeing, giving the weight of the ironwork.

Puddling.—In measuring clay puddling over vaults, arches, &c., take the length by the width, and describe the thickness.

Pulling down old Buildings.—It is usually best to get a price for this from a House Breaker, and to get this work done while the drawings and quantities are being prepared. Remember that such contractor will only pull down to the ground level unless expressly stipulated to the contrary, so that the excavation below this level must be taken in the quantities.

Drains.—Describe the quality of drain pipes, also state whether jointed in cement or with patent joints, and the net diameter of the pipes. Number the bends and junctions, which are charged as "extra," the length of the same having been taken with the ordinary pipes; also state whether single or double junctions, and in stating the size it is advisable to give the dimensions of both the pipes it is intended to unite: as 4 inches into 6 inches (or as the case may be).

Gulley-traps are numbered.

Wells and Cesspools.—In measuring wells and cesspools you will have to state the depth and nature of soil, because as the depth becomes greater, the price per yard will proportionally increase.

Where the wells are steined, they are usually numbered, and described as "digging and steining to well," including all gear, tackle, and other materials necessary for its execution, stating the depth and the mean diameter in clear of the steining, and the class of steining required, whether dry or otherwise. Remember that curbs and fittings, such as

pumps and apparatus, are to be taken in addition to the foregoing.

Concrete is usually measured at per yard cube. In measuring concrete foundations, the net dimensions are to be taken, and the description given of its composition and the method of laying, which will be found in the specification.

Concrete of a less thickness than 12 inches, or where under pavings, &c., is taken at per yard superficial (see Table I.), stating the thickness and description as before; and where extra labour in levelling the surface is required (as to receive paving), it must be so stated.

Where it is filled-in over arches, it is measured at per yard cube, but it must be described as filling-in to spandrels of arches, or as the case may be.

The mode of measuring the several items in this trade is now given in tabular form. To economise space as much as possible, each table is made to answer two purposes, namely, it gives the order of taking the trade, and also the method of measurement. It will be found very useful as a reference, to see that all the items of the trade are taken, so that nothing may be omitted. Concrete for reinforced work is generally measured at per yard cube with full descriptions, the steel reinforcement for beams, stanchions, and walls being measured and weighted up. The concrete for floors must be kept separate from that for beams, &c., and is sometimes measured at per yard superficial stating the thickness.

TABLE I.

This Table has a double use; it shows the order of Abstracting and Billing this Trade and the method of Measurement.

DESCRIPTION OF WORK.	HOW MEASURED.
Preamble.	
Digging and throwing out under 6 feet deep (describe the nature of the soil, also if to include "grubbing up and removing roots of trees" or old drain pipes, &c.) If inside an existing building, or if carts cannot be brought on to site, "including basketing" must be taken	At per yard cube.
Ditto over 6 feet and under 12 feet deep, including staging, &c....	"
Removing surface soil (stating depth)	At per yard super.

TABLE I.—*continued.*

DESCRIPTION OF WORK.	HOW MEASURED.
Digging, wheeling, and spreading, stating depth as above	At per yard cube.
Ditto and carting away, stating depth as above	,,
to trenches, part filled in and rammed, stating depth as above	,,
Ditto to wells and cesspools, stating depth and size	,,
Lime concrete in foundations, as described in preamble	,,
Cement ditto ditto	,,
Hard dry brick rubbish filled in and rammed behind walls	,,
Clay puddling, — inches deep over vaults, arches, &c.	At per yard super.
Lime concrete as above, — inches thick over site ...	,,
,, under pavings laid to falls	,,
Cement concrete, — inches thick over site	,,
,, —inches thick, under pavings laid to fall	,,
,, —inches thick (average) over vaults	,,
Remove turf, roll up same and deposit, stating distance (or relay — runs away)	,,
Levelling earth for pavings, including layer of hard dry brick rubbish — thick	,,
Turfing to site, including turf	,,
Dig, part fill in and ram trenches for gas and water pipes	At per yard run.
Dig, remove surplus, part fill in and ram to trenches, average 3 feet deep for 4-inch drain pipes	,,
Ditto ditto, 6 feet deep for 4-inch drain pipes ...	,,
Dig and remove and part fill in and ram to trenches, average 3 feet deep for 6-inch drain pipes	,,
Ditto ditto, average 6 feet deep for 6-inch drain pipes. (Take each size of pipe under 12 inches in order)	,,
Concrete (with description of thickness, &c.) laid to falls under 4-inch pipes	,,
Ditto ditto, under 6 inches, ditto under 6-inch pipes (and so on with diameter of pipes) ...	,,
Glazed stoneware drain pipe (according to size and description, commencing with smallest)	At per foot run.
Concrete casing to girders (with description and including temporary boarding)	,,
Timbering (*use and waste only*).	
Planking and strutting to sides of excavation ...	At per foot super.

TABLE I.—*continued*

DESCRIPTION OF WORK.	HOW MEASURED
Strutting and planking to trenches, giving width and depth of each	At per foot run.
Concrete encasing 4-inch pipe 6-inches all round	,,
,, ,, 6-inch pipe ,, ,, ...	,,
5-inch galvanised iron air inlet pipe and fixing ...	,,
Fresh air inlet and mica flap	At per number.
Inspection chambers giving description as to lining, open channels, depth, air-tight frame and cover, &c.	,,
Provide for testing drains	,,
Steining to wells, giving depth and diameter ...	,,
Bends, extra only, giving each diameter separate	,,
Taper pieces, extra only, stating the two diameters	,,
Junctions single, extra only, giving each diameter as single 4-inch junction off 6 inches	,,
Ditto double, ditto ditto	,,
Gullies, stating sizes and number of outlets . .	,,
Traps of various kinds	,,
Ends of pipes make good to drains	,,
,, ,, cesspools	,,
,, ,, grease traps	,,
,, ,, tanks, &c.	,,
L.C.C. jointing of lead and earthenware (stating diameter)	,,
Connection to sewer and pay fees, stating depth, &c.	,,

Abstracting.—In abstracting excavator's work, very little or no instruction is necessary, the number of items being so limited. Care must be taken to keep the different works separate; a column or two being allotted to each, according to the size and nature of the job.

In **Billing**, always take the "cubes" first; secondly, the "supers"; thirdly, the "runs"; and lastly, the numbers."*

The depth given by the *Standard Method of Measurement of Building Works* for digging stages is 5 feet as against 6 feet recommended on page 13.

* It is advisable to follow the order in which the various articles are placed in the Table in respect to this trade, and in the trades that follow.

CHAPTER III

BRICKLAYER

BRICKWORK is usually valued at per rod of 272 superficial feet, $1\frac{1}{2}$ brick or $13\frac{1}{2}$ inches thick, all work, of greater thickness, being reduced to this standard. Should the work, however, be under this thickness, it is sometimes kept separate from the general work, and described according to its nature; also where the joints have to be struck on both sides, as, for example, in boundary walls.

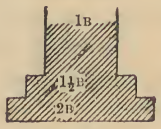
One-brick and $\frac{1}{2}$-brick walls may be measured at per foot super when faced on both sides, and $\frac{1}{2}$ brick walls are often so treated whether faced or not.

In measuring walls take the length by the height, and describe the thickness. The several thicknesses are reduced to the standard in the abstract, as will be shown hereafter. Some surveyors keep these same lengths for the concrete, footings, and even digging to trenches, as in the latter cases the altered lengths, when added together, amount to the same thing.

Commence with the foundations, taking from the base to the top for the height of the footings, and average them for the thickness.

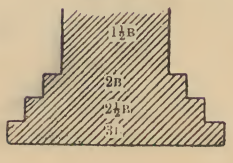
Thus, assuming the length to be 20 feet in each case :—

FIG. 1.



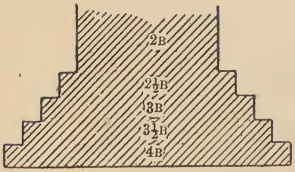
would give	20·0 6	10·0	$1\frac{3}{4}$ B. footing

FIG. 2.



would give	20·0 9	15·0	$2\frac{1}{2}$ B. footing

FIG. 3.



would give | 20·0 / 1·0 | 20·0 | 3¼ B. footing

In measuring the walls to obtain the total length for the brickwork, take all the vertical walls on plan of one thickness out to out, and all horizontal ones in the clear between the walls.

On page 18 (Fig. 4) is given a plan showing the footings from which to take out the quantities.

As before stated the total length is the same for the digging, concrete and brickwork, and should be carefully set out in detail. It is hoped that the lettering will make this example quite clear:—

14-inch Walls.

H				Wall on W. of entrance	22·6
G	2	/	3	Projections (each 9 inches)	4·6 —— 27·0

House.—Vertical 14-inch Walls.

A	W. side of hall and sitting room	22·6
B	W. wall of kitchen	6·0
C	S. centre pier, outside hall ...	2·0
D	E. side of hall	10·2
E	E. side of living room	11·9
F	E. wall of scullery	10·3 —— 62·8

Horizontal 14-inch Walls.

I	Wall south of hall	10·3
K	S. of living room	14·3
L	Wall north of kitchen and scullery	18·0
M	South of scullery	5·6
N	3 piers on E. of entrance, 3/1′·2″	3·6
P	Bay window	5·0 —— 56·6
		146·2

Note.—The angle chimneys would be taken separately.

Next, the 9-inch walls:—

Q ...	*Vertical*—E. of w.c.	6·6
R	Division (w.c. and yard)	5·0
S	Centre of living room	10·0
T	Division wall (kitchen and scullery)	8·0
V ...	*Horizontal*—S. of yard and w.c. ...	10·0
X	S. of kitchen (and return)	10·6 —— 50·0

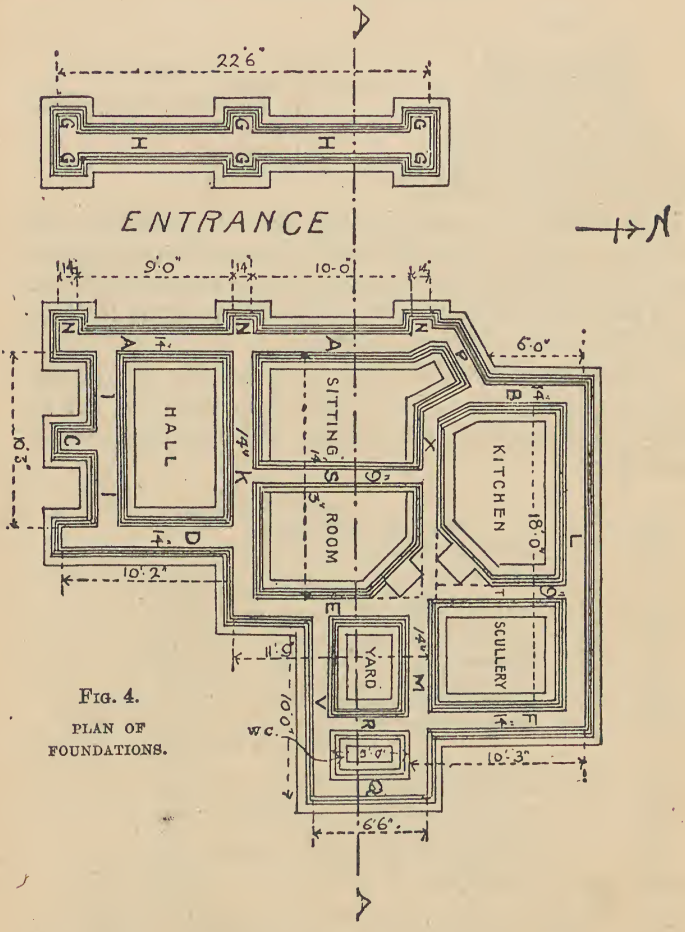


FIG. 4.

PLAN OF FOUNDATIONS.

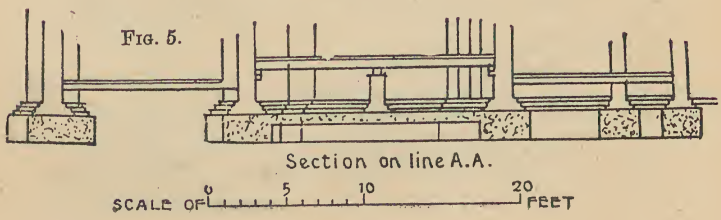


FIG. 5.

Section on line A.A.

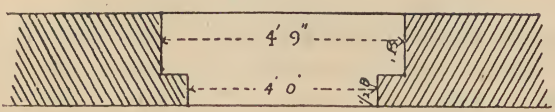
SCALE OF 0 5 10 20 FEET

Then we have for footings :—

	146·2	
	9	$2\frac{1}{2}$ B. in foots.
	50·0	
	6	$1\frac{3}{4}$ B. „
2/$\frac{1}{2}$/	3·10$\frac{1}{2}$	Cube brickwork in foots to kitchen.
	3·10$\frac{1}{2}$	
	6	Angle chimneys.
	3·4$\frac{1}{2}$	
	3·4$\frac{1}{2}$	
	9	Add do. (do. sitting room.)

After the footings, take the wall up to under side of ground-floor joists, and so on, floor by floor, or as high as the wall continues of the same thickness, taking care to make the several additions and deductions as they occur. A little care is necessary when making deductions. In deducting openings

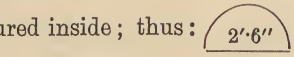
Fig. 6.



to windows or doors, where there is a reveal, as Fig. 6, two dimensions will be necessary, the deduction for the $\frac{1}{2}$ brick being less than that for the 1 brick ; thus :—

4·0		
6·0	24·0	$\frac{1}{2}$ B. ddt. window.
		4·0
		2 reveals 9
		4·9
		6·0
		1 reveal 3
		6·3
4·9		
6·3	29·8	1 B ddt. window. (Dining room, N.E.)

And in the case of windows should there be any deduction for window back, it will have to be taken in addition to the foregoing.

No deduction is made for window sills, or strings under 6 inches in height, nor for any woodwork under that depth; and where wall plates are placed above the walls, 3 inches is sometimes added to the wall, and charged as brickwork to pay for the cost of bedding. Circular and semicircular works are indicated as such in the dimension book, and the diameter figured inside; thus: 

Where the item is a cube, the depth or height placed under: thus—

10·0	49·0875	Cube brickwork to circular chimney.

Chimney Breasts and **Flues** are measured similarly to the other work, taking first the footings, stating the thickness beyond the wall, and deducting only for the openings for fireplaces, the flues being measured in, as if solid, and afterwards numbered for "coring" and "pargeting."

It is also advisable at the time of measuring the chimney breasts to take the trimmer arches, which are measured and valued by the foot superficial, taking the length by the breadth. They are described as "half-brick trimmers in cement," the centering being measured at the same time, and afterwards abstracted in the carpenter. Take also the wrought-iron chimney bars to carry arch over opening at per foot run, according to specification, generally 18 inches longer than the opening and caulked up and down at both ends. This is afterwards abstracted in the smith's bill, and valued at per weight. Angle chimneys (Fig. 7) are measured as solid, the chimney openings only being deducted as before described and

afterwards reduced to ordinary standard; thus, presuming the height to be 12 feet, we should have

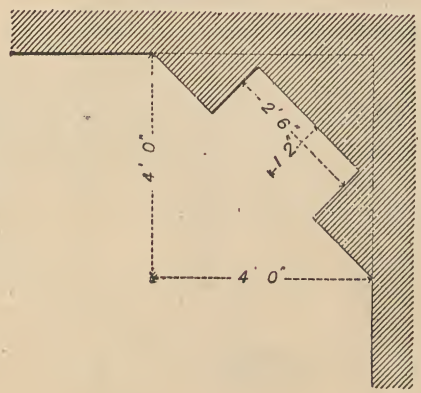
½	12·0		
	4·0		
	4·0	96·0	Brickwork in angle chimney.
	2·6	8·9	1½ brick ddt. opening.
	3·6		

Ovens and **Coppers** are measured as solid brickwork, deductions being made for the ash-holes only.

Firebricks and **Lumps** are charged as "extra."

Facings.—When the brickwork is faced with a superior class brick to that used in the general work, this is charged as "extra only" to the brickwork, and measured and valued at per foot

Fig. 7.



superficial as "extra only to picked stock facing," white Suffolk or other facing, including pointing; and if the reveals to windows and doors be not plastered, they will have to be added and included in the facing; also add as much of the return walls as show the facing bricks. Make all the deductions as for ordinary brickwork, deducting also the arches, which are charged separately.

Pointing is measured sometimes by the foot super, and sometimes by the yard, and sometimes by the square of 100 feet superficial. The first named is, however, the ordinary way of measuring it, and is considered the best, and it has therefore been so described in Table II.

Cuttings.—Cuttings are measured at per foot super, when over 6 inches wide; under that, at per foot run. It will also be necessary to state the nature of the cutting, whether rough cutting, as over relieving arches and where not seen, or, if fair cutting, cutting to skewbacks, &c. Bird's mouth cuttings and cutting to squint quoins are measured at per foot run, and described according to the nature of the work, whether "rough" or "fair."

Arches and Vaulting are measured at per foot super. Take the length by the mean girth between the *intrados* and the *extrados*; and state the thickness. This is afterwards reduced to the standard rod, and valued accordingly.

Gauged Arches, Axed Arches, &c., are measured by taking the width of the opening between the reveals, and adding to the dimension the projection of one skewback for the length; then take the height as follows (see Figs. 8 and 9).

Fig. 8.

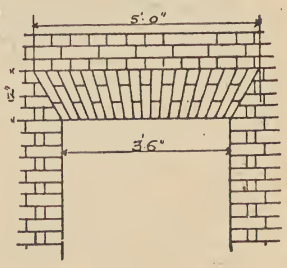


Fig. 9.

	′	″
Opening... ...	3	6
1 Skewback ...		$4\frac{1}{2}$″
	3′	11″

3 11″
1 · 0 3′ 11″. Extra to gauged arch in T.L.B. set in putty (or as the case may be).
3 · 6
· 9 1 4. Add soffit.
5′ 3″

Groined Arches are measured in the same way as ordinary arches; the cutting to groin being, however, taken separately at per foot run.

Relieving Arches are charged as extra to the ordinary brickwork, they having been taken and included in the ordinary walling. They are afterwards averaged (that is, the openings) and the width of soffit stated thus :—

No. 24.—Extra only to relieving arches in cement, in three half-brick rings to 4-ft. openings (average), and 1b soffit.

Centering, it will be seen by the Table, is taken at per foot super, measuring the soffit of the arch. The turning pieces are measured at per foot run, stating the length and width of soffit only.

It is also advisable to measure the cuttings after the arches for the sake of convenience: thus, in the example just given, the cutting would be taken and described as :—

2/ 1·2 ·9	1·9	Fair cut skewbacks.

If the arch be segmental, it will be necessary to describe the cutting as "cutting to face bricks to fit segmental arches," or as "circular fair cutting" where the arch is semicircular, greater labour being entailed where the cutting is circular. It should be particularly observed that all cuttings should be described as they are executed.

Circular Brickwork must be kept separate from the straight, and described accordingly. If under 20 feet radius, it is customary to state the radius. Some surveyors allow $1\frac{1}{2}$ times the straight to meet the additional labour, without describing the work as circular; but this should not be done, as all work should be described in the bill according to the nature of its execution, whether circular or straight. It is always understood to be straight unless otherwise specified.

Brickwork in Cement is measured with the ordinary brickwork in mortar, and an extra charge made to meet the increased price for the cement. It is therefore measured first

with the brickwork in mortar; and the same item appears a second time as 'extra only' in cement. Items, however, other than the plain brickwork are specified, without the extra, as trimmer arches in cement, &c.

It may be as well to observe here that all brickwork is understood to be executed in mortar unless specified to the contrary.

The measurement of **bricknogging** includes the timbers, but there must be deductions therefrom for the openings where they occur.

Brick Paving.—State whether brick on edge or brick flat, also whether in cement or mortar, &c., also the quality of the bricks.

Tile Paving is measured by the yard super, and a P. C. given. If tiles are 6 inches or 4 inches, then either measure as a multiple of 6 inches or 4 inches, as for instance 19 feet 3 inches would be taken as 19 feet 6 inches, or in the case of 19 feet 3 inches with 4-inch tiles, it would be 19 feet 4 inches in this way of measuring bill as including cuttings; another way is to take the net area and measure for cuttings at per foot run, and state whether straight or raking. *Wall tiling* is measured in the same way, and all angles specially taken as cutting.

Rendering in cement by bricklayer is sometimes measured by the yard and sometimes by the foot superficial; the former, however, is more generally adopted, and it is therefore so placed in the Table. It is described as "rendering in cement from the trowel."

Brick-on-edge Coping.—Measured at per foot run, stating thickness of wall, and described as "extra only" to brick on edge in cement, it having been firstly measured in with the brickwork in mortar.

Pointing is taken and measured similarly to "facings." The description is taken from specification, as struck pointing, &c., and the nature of the work should also be stated, whether to old or new fronts, and if scaffolding is required.

In measuring **tile creasing**, state if bedded in cement or mortar, and if laid double.

In taking slate or other **damp course**, it is necessary to give an exact description ; it is measured at per foot super.

Hoop-iron bond is taken at per foot run, giving size and description, whether tarred and sanded, or as the case may be. It is afterwards abstracted, brought into the smith's bill, and charged at per weight.

Brick Drains require to be described. If egg-shaped, it is best to measure them at per foot run, stating net diameter and number of half-bricks in thicknesses of the ring, including centering, &c.

Glazed Sinks should be numbered with a full description of size, &c.

Cesspools, it will be seen, are numbered, giving the depth and diameter, and description of method of finishing. Number the drain pipes discharging into same, and describe as "extra to making good to drain pipes."

Terra Cotta.—This material belongs to the bricklayer's trade, and should follow that trade under a separate heading (see Table). In measuring take all work as solid, and make no deductions in the brickwork for the space taken up. Mention this in the bill.

Care must be exercised in taking-off to see that the joints are properly arranged, and a model must be taken for each piece where of a different form. In the case of moulded jambs and other mouldings, many pieces will easily reverse. One model will in such cases serve for these. A figured sketch should be given of each model required, as being necessary for the builder to arrive at his price.

Where the work contains enriched portions a very careful sketch must be given, so that an allowance may be made for modelling, &c.

This is often provided for by the architect obtaining an estimate from a carver, and placing in the estimate a P. C. sum.

Great care is necessary in this trade to give a careful and full extract from the specification of the class of work required. State from what district it is to be obtained, the

average thickness of the terra cotta, the composition with which it is to be filled, and if to be filled before or after fixing, the form of joint and mortar to be used. If hoop-iron or expanded metal bond is used (or galvanised), it should be mentioned, also any other special items that will affect the price.

Where the basement or any special portion is required very quickly, it is well to keep this distinct and head it in the bill, with the time it is required by, as

Terra Cotta in Basement (or elsewhere) to be delivered in— weeks from date of contract.

In measuring this work whether the terra cotta is in dressings only or in facing, take it systematically floor by floor to the level of each, and note in the taking-off where each floor ends.

Take the work under the following headings :—

Plain blocks, as ashlar, &c . . . at per foot cube.
Ordinary moulded blocks, as
Plain cornices and moulded jambs, &c. „ „
Enriched work . . . . . „ „

Take, as you come to them, notchings for sills, &c., copper cramps, or dowels and mortices, and number these. Take at per foot run the labour of cleaning off door and window reveals for wood frames, also the cleaning of grooves for lead lights, &c. A list, showing the order of billing and method of measurement, has been placed under Table 2.

Faïence, Silicon, and Glazed Ware.—This form of decoration is now being largely used, but as the design and prices vary much, it is usually provided for by a lump sum, and it only becomes necessary to so mention it and to provide for the attendance of the bricklayer, plasterer, and other trades during its fixing, and the provision of all requisite moulds, &c.

Wall lining of plain colours is taken at per yard super, with extra for all cornices and mouldings at per foot run ; also all angles, mitres to the several cornices at per number, classifying each.

Concrete Buildings.—This form of building should be billed

under a separate heading as an addition to the bricklayer's bill.

Make a most careful abstract of the general items that deal with the quality of the materials, how the work is to be completed, &c. Be careful to state the portion that is in walling, and include for the use and waste of all scaffolding, moulding boards, apparatus, centering, &c. In measuring, keep separate the walls under their different thicknesses and bill them as such. Take the door and window openings, and super them, then average them and keep them in two sizes, as for instance, averaging 20 feet super, or averaging 30 feet super, and bill them as numbers of labour to forming openings, average — feet super each with square heads, &c.; or where the opening is extra large number accordingly, keeping in each case those of different thicknesses under different headings (see addenda to Table II.).

Hoisting.—In Bricklayer and also in Mason, keep separate all work requiring hoisting over 60 feet, and bill accordingly, and after this height divide the total heights into heights of 20 feet, as being over 40 feet and under 60, over 60 and under 80 feet, and so on.

Abstracting.—In abstracting this trade, it is necessary to allot a certain number of columns to the several descriptions of work, as recommended in the "Excavator"; but great care and circumspection will be necessary in the uninitiated to obtain a proper arrangement. It is, therefore, advisable to enter the several items as widely apart as possible, leaving, of course, greater space for those that occur the more frequently.

In an ordinary job one column will suffice for cube brickwork, one for 1 brick, and another for 1½ brick, with an additional column between them for the deductions. Deductions are made where practicable on the dimension paper (as, for example, where the deduction occurs after the addition), so saving unnecessary labour.

In making deductions before taking to abstract, great care is

necessary to see that the deduction is one of the same value as to thickness of walls.

The next three or four columns will be taken up with "extras"—as brickwork in cement, facing bricks, arches, and the other superficial quantities.

We then allot the remainder to the "runs," or lineal dimensions, leaving two or three columns for the numbers, and any remarks.

With respect to the brickwork, as the standard adopted consists of 272 feet superficial of 1½ brick thick, all brickwork will have to be reduced to this thickness. This is accomplished by multiplying the superficial area by the number of half-bricks that the wall contains in its thickness and by dividing by 3, or if the thickness contains a quarter of a brick, the multiplier is the number of quarter bricks in the thickness and the divisor is 6.

If we take the case already given with respect to footings, we have 50 feet of 3¼ brick, which will give us 108 feet 4 inches of 1½ brick. It will be necessary to divide some dimensions between the two: thus, supposing it to be 2½ bricks, we should have 50 feet of 1 brick and 50 of 1½ brick in the abstracting, this being the easier method of reducing the quantity.

Cube Brickwork is abstracted as such (in feet). It is afterwards reduced to the standard of 1½ brick by multiplying by 8 and dividing by 9.

TABLE II.

This Table has a double use: it shows the order of Abstracting and Billing the items of this Trade, and the method of Measurement.

DESCRIPTION OF WORK.	HOW MEASURED.
Preamble.	
Stock brickwork in mortar	At per rod reduced.
„ to fence walls, or walls under 1½ brick, finished fair both sides	„
Stock brickwork in backing to stonework or cutting to same...	„
Stock brickwork in raising to existing walls ...	„
„ on girders	„
„ in hollow walls, stating thickness and number and forms of ties, &c.	„

TABLE II.—*continued.*

DESCRIPTION OF WORK.	HOW MEASURED.
Stock brickwork in vaulting	At per rod reduced.
„ circular on plan—feet radius ...	„
„ in cement	„
„ in underpinning (including in short lengths)	„
Facings, extra only over stocks in various forms, commencing with cheapest forms	At per foot super
Facings, battering face extra only over stocks ...	„
Gauged and axed arches (extra only to)	„
Rough cutting „ „	„
Fair cutting (stating on what)	„
Circular fair cutting	„
All cuttings over 6 inches wide	„
Pointing, with description of mortar joints, &c...	„
Half brick walls in cement	„
Trimmer arches in cement	„
Damp course, with description	„
Rake out point and limewhite on new brickwork	At per yard super.
„ „ „ on old brickwork	„
Limewhite on wood	„
Bricknog, flat or on edge	„
Brick paving (flat) in mortar	„
„ on edge in mortar	„
Tar paving, various forms	„
Tile paving, various forms, including cutting or otherwise	„
Cement paving (stating thickness and method of finishing)	„
Cement face and float on concrete for paving ...	„
Rough rendering in cement on brickwork	„
Cutting to bird's mouth...	At per foot run.
„ squint quoins	„
„ angle of battered face	„
Chamfers on brick	„
Splays under 6 inches wide	„
Beads and quirks	„
Chases in brickwork, stating size...	„
Wedge and point to flashings in cement (cover)	„
„ „ „ stepped in cement	„
Cement filletings	„
Cut and pin landings in cement, stating thickness	„
„ and tooth new wall to old, stating thickness of new to old	„
Level and prepare old walls to receive new ...	„
Extra labour and materials bonding and cutting new, 1½ B. wall to old	„
„ „ 1 B. wall to old	„
Brick in cement core for columns, stating size...	„
1½″ × ⅛″ hoop-iron bond lapped at joints and angles and laid in joints	„
Expanded metal bond ditto, ditto, stating gauge and width	„

TABLE II—*continued.*

DESCRIPTION OF WORK.	HOW MEASURED.
Brick in cement core for cornices, stating size ...	At per foot run.
Extra only to brick cornices, giving sketch of section, and state what in, &c....	,,
Extra only to brick on edge and tile creasing, and state what in, &c.	,,
Cuttings and pavings	,,
Forming gutter in asphalte roof	,,
Large frames bedded and pointed	At per number.
Small frames	,,
Flues cored and pargeted, stating space and thickness of walls	,,
Extra only to labour in forming relieving arches	,,
Setting to stoves, including all fire-bricks	,,
,, range, ,, ,, ,, ...	,,
,, coppers and their ironwork, including fire-bricks	,,
Chimney pots and setting, stating height	,,
Glazed stoneware sinks, stating size, &c.	,,
Setting chimney-pieces	,,
Air bricks, and forming opening through walls...	,,
Cut and pin ends of steps, thresholds, timbers, &c.	,,
,, ,, ends of girders, joists, &c....	,,
Perforations through walls for pipes, stating sizes of pipes and thickness of wall	,,
Brick fenders around gulleys	,,
Returns, stating to what cornice they belong ...	,,
Mitres, ,, ,, ,, ...	,,
Angles stating to what cornice they belong ...	
Cesspools and wells, with full description and thickness of walls, &c.	,,
Attend upon all trades.	
TERRA COTTA.	
Preamble (full).	
Terra cotta as above in plain work, including hoisting and setting at levels shown	At per foot cube.
Terra cotta as above in moulded work	,,
,, ,, enriched ,, ...	,,
Cleaning down door and window reveals for frames	At per foot run.
,, grooves for glass	,,
Use and Waste of Models. Here begin with description and sketch of simple ones and least in number	At per number.
Ends cut and pinned	,,
Notchings	,,
Mortices	,,
Dowels	,,
Cramps, copper or otherwise	,,
Provisions for carving for enriched work of £——, or give sketches of work	,,

TABLE II.—*continued.*

DESCRIPTION OF WORK.	HOW MEASURED.
CONCRETE BUILDINGS.	
Preamble.	
NOTE.—This table refers to the concrete only, and does not include other trades, &c.	
Concrete in foundations	At per yard cube.
„ walls 4 inches thick, including planking, &c.	At per yard super.
Concrete—here give the various thicknesses in order, upwards	„
Concrete in floors 8 inches thick, measured over joists	„
Extra only to labour to forming openings average 20 feet super	„
Then follow with other larger ones, stating whether square-headed or otherwise	„
Extra only to labour in forming openings through concrete for pipes, &c.	„
Attend upon all trades.	

TILER.

Examine the specification and take careful note of the quality and gauge of tiling, also how laid, whether dry, or pointed or torched. If secured by oak or other pins, or by zinc, copper or galvanized wrought iron nails, if on laths or battens, and thickness of laths if used, if nailed or pegged as the case may be every third (or fourth) course, remainder being hung by nibs on back of the tiles if this kind of tile is used. On spirelets, turrets, sides of dormers and any other rather inaccessible positions where scaffolding will probably be needed for the work, the tiling should be kept separate and so billed with description. If in very small faces keep separate and state positions. Where there are close mitred hips, they should be measured and so described, mentioning the kind of pointing required.—"Swept" work should be measured and billed as "extra only over plain tiling for being on sweep."

Roof tiling is measured by the "square" of 100 superficial feet.

In measuring tiling, whether plain, pan, or ornamental, take the extreme length of eaves from out to out, by the breadth from eaves to ridge, measuring the latter from the section.

Twice this amount, if the building is rectangular, will give the superficial area of tiling for the roof. Divide this item by 100 to get the number of squares.

If the building is hipped at both or at one end, the dimensions will still be taken as above from out to out, as whether the roof be hipped or gabled the superficial area will be about the same; and of course this measuring materially shortens the labour.

Deduct all openings, as chimneys or skylights, &c., and allow the total length by 3 inches for cutting. Measure all tiling, whether ornamental or otherwise, and add the measurement of the ornamental tiling and describe it as "extra only to ornamental tiling over plain."

Special hip or valley tiles will be taken as extra only over plain tiling, adding to the general dimensions the allowance for cutting and waste. Ridges take at per foot run, stating number from price list or P.C. per foot; state how fixed, if dowelled, &c.

Finials take at per number, and put P.C. cost. Number intersections of ridges where no finials. Hip hooks should be numbered and weighted, and sketch given, and abstracted in "Smith."

Vertical Tiling.—Describe quality, gauge, &c., and state how secured in the same manner as described for plain tiling; and measure battens, and abstract in carpenter, stating how plugged, &c.

The following allowances in the measurement of plain and pan tiling must be made upon the net superficial area of the tiling.

In Plain Tiling.

	Inches.	
For verge	4 extra.	
„ dripping eaves	6 „	
„ cutting hips, &c.	6 „	or 3 inches each side.
„ valleys	12 „	or 6 „ „

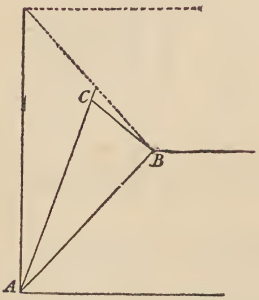
In Pan Tiling.

For cutting to hips, splays, &c., at per foot run, described as "splayed, cutting and waste."
For cutting to hips and ridges at per foot run.

Take the **filletings** at per foot run, describing whether in cement or mortar. Also the pointing to verge. Number the hip hooks and T nails, and state in how many oils they are to be painted.

To ascertain the length of the hip rafter there are two or three methods, but the following is perhaps the simplest and best :—

Fig. 10.



Make the hip line on the roof plan the base of a right-angled triangle, the perpendicular of which is the height of the roof as delineated on the section, and the hypothenuse will be the length of the hip or valley. Taking the example of the plan of roof given, of which A B is the hip, make B C at right angles to A B, and the same length as the roof is high. Then A C will be the required length of the hip.

A specimen is given (pp. 34-35) of the taking-off, abstracting and billing of a tile roof, which will serve as a guide.

Table III.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

Preamble.	
Plain tiling as above	At per square of 100 feet super.
Extra only to ditto circular on plan with radius feet...	,,
Extra only to difference of ornamental tiling over plain, as sketch	,,
Pan tiling, as above described	,,
Vertical tiling, as described	,,
Extra only to difference of vertical ornamental tiling over plain, as sketch...	,,

Taking-off.

	35·6		
	15·6	549·9	Broseley plain tiling on double fir laths and compo. tile pins, showing on the face 3 inches
	16·3		
2/	21·6		
	15·6	666·6	Add to ditto
	16·3		
	15·6	251·10	Add ditto
	74·9		
	6	37·5	Add for eaves
	76·6		
	4	25·6	„ verge
	37·6		
	1·0	37·6	„ valleys
	19·0		
	6	9·6	„ hips
	29·7		
	3	7·4	Add cutting for chimneys
		1585·4	
	1·10½		
	7·6	14·1	Deduct chimneys
	2·8		
	2·9	7·4	„ „
		21·5	
	37·6	37·6	Purpose made valley tiles, even pitch
	19·0	19·0	Do. do. hip do.
	50·0	50·0	Tile ridge (dowelled) P. C. 1*s.* 6*d.* per foot, bedded in lime and hair and pointed with coloured mortar.
	76·6	76·6	Plain tile heading and pointing in cement to verges.
	1	1	Extra only to intersection of ridge *a b*.
	1	1	Hip finial P. C. 1*l.*, and add for carriage and fixing.
			Wait on all trades.
			Leave all perfect.

Length of rafter 15·6

Collect eaves
35·6
11·6
11·6
16·3
74·9

Collect verge
2/ 15·6 = 31·0
2/ 15·6 = 31·0
2/ 7·8 = 14·6
76·6

Collect valley
2/ 18·9 = 37·6

Collect hip
2/ 9·5 = 19·0

Collect cut for chimneys
2/ 1·10½ = 3·9
2/2 3·9 = 15·0
18·9
2/ 2·8 5·4
2/ 2·9 5·6
29·7

Abstract.

Preamble.	Broseley plain tiling on double fir laths and compo. tile pins, showing on the face 3 inches		Purpose made valley tiles.	Ditto hip tiles.	Extra only to intersection of ridge tile.
	1585·4	Ndt. do.	37·6	19·0	1
	21·5	~~21·5~~	Plain tile heading, and pointing in cement to ridges		Hip finial P. C. 1*l.*, and add for carriage.
	1563·11		76·6		1
	sq. ft. 15·64		Tile ridge dowelled, P.C. 1*s.* 6*d.* per foot, bedded in lime and hair and pointed with coloured mortar.		
			50·0		

*Bill.**

sqrs.	ft.	in.		
				Preamble.
15	64	0	supl.	Broseley plain tiling on double fir laths and compo. tile pins, tiles showing on the face 3 inches ... ...
	76	6	run	Extra to plain tile heading and pointing in cement to verges ... ...
	19	0	run	Extra only to purpose made hip tiles...
	37	6	run	Do. do. valley do. ... ...
	50	0	run	Tile ridge (dowelled), P. C. 1*s.* 6*d.* per foot, bedded in lime and hair and pointed with coloured mortar ... ...
			No. 1	Extra only to intersection of ridge tile as above ... ...
			No. 1	Hip finial P. C. 1*l.*, and add for carriage and fixing ... ...
				Attend on all trades and leave all perfect at completion of building ...
				Carry to Summary ... £

* If a separate bill, give description of where work is to be executed, &c.

TABLE III.—*continued.*

Extra only to purpose made hip and valley tiles, equal slopes	At per foot run.
Extra only to ditto, but unequal slopes, (with sketch)	,,
Ridge tiles of pattern ——, or at P. C.	,,
Extra only to mitres to ditto	At per number.
And to hips	,,
Finials, P. C.	,,

FIG. 11.

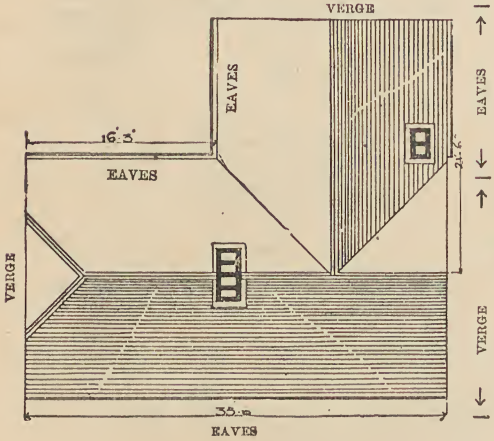
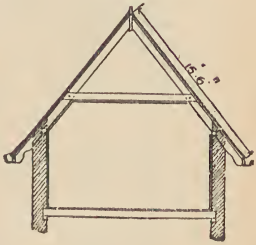


FIG. 12.



The *Standard Method of Measurement of Building Works* states that all cuttings, eaves, courses, and verges shall be billed as feet run and not supered in the measurement as recommended herein. A further measurement is to be given to top edge of tiling, the rule being as follows :—" Top edges of tiling shall be given in feet run and described as cutting and waste to top edge of tiling, and shall also be given under sills of dormers, lanterns, skylights, and against lower sides of chimney stacks and all other openings which occur in the tiling."

CHAPTER IV

SLATER AND SLATE MASON

SLATING is measured by the square of 100 superficial feet. Take the length by the breadth, the latter being taken from the edge of the eaves to the top of ridge as with tiles. Add to this whatever appears of the lower course of slates. Thus supposing the slates to be countesses (20 by 10) and laid to a 2-inch lap, the bottom course will show 9 inches. This would be the required addition to make to the measurement.

Allowance for hips and valleys is made as follows. Take the length by 6 inches wide on each side, and add to it the measurement as an allowance for cutting and waste, the hip being measured as described on page 33. In addition make an allowance of 6 inches wide by the length for all irregular cuttings, as, for example, to angle chimneys. Make deductions for all voids as they appear, and allow the length of all deductions by 6 inches for cutting and waste. If voids are under one yard superficial most surveyors disregard them.

Where the slating is laid circular it must be kept separate from the straight, and described accordingly. It is measured similarly to the straight, with the same allowances.

Be careful to state the description of slating used, with the size (whether duchess, countess, &c., &c.), naming the quarry and port of shipment, and if possible the vein, as there is much difference in quality even in the one quarry. Bearing in mind that the "Best" slates are thin and the "Seconds," are much stouter, discriminate, according to the kind of roof you really require, in the use of these words. Also specify the lap, kind and quality of nails, number to each slate, where nailed, whether nails are of galvanised wrought iron, copper, zinc, &c. It is important to state the length and weight per 100 or 1,000 of the nails.

It may be advisable here to give the size of slates generally in use—

	In.	In.		In.	In.
Queens	36	by 24	Countesses	20	by 10
Imperials	30	„ 24	Viscountesses ...	18	„ 9
Princesses	24	„ 14	Ladies	16	„ 8
Duchesses	24	„ 12	Doubles	13	„ 6

Note.—Of these the duchess and countess are the more commonly used. Of course it will be necessary to keep the different descriptions of slating separate, also to state whether fancy slating—slating laid diagonally being so called.* Should the slating be required to be cut in any form, a sketch would the better exemplify the description, and should be given to enable the contractors to estimate with greater certainty. Slate ridges and cresting are measured at per foot run. State whether set in red lead, putty, and screws, &c. Slate hips are measured at per foot run, as will be seen by perusal of the Table IV. Measure all filletings, and state whether in lime and hair mortar or cement. These are billed with the bricklayers' work, as before described.

Damp Course is measured by the foot super.—Take the length by the width, and state whether laid double, and if bedded in cement. (See page 25.)

Creasing.—In taking this item it is necessary to state if in cement. Usually measured by the foot run with full descriptions.

Shelves are measured at per foot super.—Take the length by the width, and include in such measurement any portion let into walls.

The edges, where rubbed or rounded, to be taken at per foot run, and described how they are to be finished.

Rebates, grooves, tongues, &c., are measured at per foot run. If the joints be cemented with red lead or putty, it must be stated.

The cutting and pinning into wall is also taken at per foot run. See Table II. in Bricklayer.

* All questions of reasons as to whether it should be so called are avoided, the desire being only to deal at present with that which exists.

Cisterns are usually numbered, stating the description of slate with the thickness required for sides and bottom, and the capacity of water required in gallons. It is advisable also to give the inside or net dimensions of the cistern, as if the bottom is thicker than the sides, as is customary, it will be impossible to form a correct estimate where this is not done. Describe how it is to be put together, specifying the bolts and nuts. All holes for plumber are taken at per number "extra." It should be also stated if it is to be fixed, as otherwise this may be afterwards charged as "extra."

Slate Sinks may be numbered or measured by the foot super.—Give the dimensions, length, breadth, and depth, and full description, stating if fixed, including cutting and pinning into wall, &c. All holes are to be taken as "extra." If rebated, it must be stated, as it might be an "extra." See the Table as to the method of measurement.

Paving at per foot super.—It is necessary to describe as to the finishing to surface, whether rubbed, &c., and if the edges are sawn or rubbed they will be measured separately at per foot run.

Skirtings at per foot run.—Take the length and describe the width and thickness of the slate, including all screws and drilling holes.

Louvres at per foot run.—In taking these it is necessary to state the depth and thickness of slate, and the surfaces if planed, &c., including edges. Number the fair ends, and the fitting to stone or other grooves.

Labour on Surfaces, as planing, rubbing, enamelling, is to be taken at per foot superficial.

Chimney-pieces are usually numbered and a price affixed, the price and value thereof differing almost as much as in the case of marble.

Should the reader wish to find the amount of slates necessary to cover any given roof—take the length the third slate covers the first from the length of the slate, and divide the remainder by two. Multiply the result by the width of the slate, and the product will be the number of square inches of the surface of a single slate. The total area of the roof divided by this

result will give the total number of slates required.* It will be necessary to make an addition for double course at eaves, and for the cuttings to hips, &c.

TABLE IV.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

Preamble.	
Slating	At per square of 100 ft. super.
Follow with various forms	,, ,,
Extra only to circular over straight ...	,, ,,
Torching to under side of slates	,, ,,
Slate ridging	At per foot run.
,, hips	,,
,, shelves	At per foot super.
,, paving	,,
,, creasing	At per foot run.
,, louvres	,,
,, skirtings	,,
Labour to planing to surface	At per foot super.
,, edges, grooves, rebates, &c....	At per foot run.
Slate cisterns	At per number.
,, sinks	,,
Cutting holes for plumber	,,

* It is perhaps simpler if put as a formula:

$$\text{Number of slates} = \frac{\text{total area of roof}}{\frac{\text{length of slate} - \text{lap}}{2} \times \text{width of slates.}}$$

Note.—All dimensions to be either in inches or in feet. Similar rules to the rules for measurement of tiling are given by the *Standard Method of Measurement of Building Works.*

CHAPTER V

MASON

PROBABLY there is no trade about which so much difference of opinion exists in the method of measuring as that of the mason. And who shall say which method is right? Each surveyor holds to his own idea as the correct one; and if reference be made to the really practical men—the masons themselves—the statement may be ventured that we shall get just as many conflicting opinions as are to be found amongst those who study simply the theory. Happily, however, the differences that do exist are principally confined to the descriptions of the labours expended upon the stonework; and this arises in some degree from a want of knowledge as to how the stone should be worked, or what preparatory labour should be taken on stonework in cases of elaborate detail; consequently these matters are apt to be expressed incorrectly. It should always be observed that the labour upon stonework is to be measured and described according to the nature of its execution, and as worked upon the *banker*, and should at the same time be measured in the order in which the labours are worked, the inferior work generally being done first and the superior faces last. In proceeding to the measurement of stonework, there will of necessity be many who differ from the methods here set forth. It has been suggested that many surveyors take out the labour on stonework somewhat excessively, so as to cover any omission in quantity or error of description, which through their incapacity might arise. It is also suggested that the more elaborately the work is measured the greater will be the

builder's estimate. Still, this should not deter men from pursuing a course which is manifestly correct. We frequently see, in small jobs especially, the omission to measure labour at all, trusting to descriptions and sketches. Where works to be carried out are of any considerable extent, half-a-dozen builders would submit tenders as widely different as those that are so constantly brought before our gaze in the professional papers; and who shall say that these very cases do not arise from some such cause? In small jobs, such works as string-courses, copings, plinths, &c., may perhaps be measured in this way.

Waller.—There is one description of stonework, however, which requires very little practical knowledge in ascertaining the way of measurement, and as this is the simplest, and of a much less expensive nature than the ordinary descriptions, it will be treated first. This is the **stone-rubble walling**; and although there are so many kinds of this class of stonework, they are all measured in one uniform way, which way, however, depends upon the standards adopted in the several localities in which the stone abounds. In neighbourhoods within the vicinity of the stone quarries, and where stonework is cheaper than brickwork, it is frequently the case for houses, &c., to be built of the stone in what may be termed its natural state—that is, unworked. In such cases the method of measurement depends upon the locality, and as various localities have different methods, it is always advisable for a surveyor to consult some one in the neighbourhood as to the local standard of measurement. That which has been found to be a usual rule in such cases is to measure by the yard superficial, and state the thickness of the wall and the description of the work, whether coursed or uncoursed, or as the case may be. In some districts, again, this kind of stonework is measured by the perch of 18 superficial feet of a uniform thickness of 24 inches—all thicknesses of walls being reduced to this standard, after the same manner that brickwork is reduced to the rod of 272 feet super of 1½ brick thick. And another method is to measure it by the cubic yard. In either of the latter cases, all labour applied to the face of the work

would have to be taken and described separately, such as scabbling, &c., which in the first case—viz. where measured by the yard superficial and the thickness stated—would be obviated. Where the labour is taken separately, measure it by the foot superficial. Window and other arches, where executed in this description of material, would be measured in with the ordinary walling, and a second dimension taken of the arch, which would be described as "extra to rough hammer-dressed arches, 16 inches high, with radiating joints," or as the case may be. This is measured by the foot run. "Extra labour to forming small openings" are better numbered. Quoins, where executed of different material to the walling, must be taken separately; and where laid in regular blocks, the labour must be taken out in the manner hereafter to be explained. Where, however, they are of the same material as the wall, they should be measured in with it, and any extra labour in working and setting should be measured separately. Where the quoins are of brickwork, it is customary to measure them by the foot run; and as many descriptions of rubble-walling are provided with an internal lining of brickwork to prevent dampness, brickwork not being so susceptible to the wet as stone and it also presents a better surface to plaster against, it is usual in such cases to measure the brickwork at the same time as the stonework. The brickwork may be reduced to the rod in the ordinary manner, but will require to be described separately from the other as "brickwork in backing to rubble-stone walling."

It may be observed, in concluding this description of stonework, that it is only customary to deduct other kinds of stonework and other material where it is over 4 inches in thickness.

Proceeding then to the measurement of wrought stonework, or stonework upon which a much greater degree of labour is expended in the working of the faces, beds, and joints, we arrive at that portion of our subject which requires more experience and a greater amount of care. A drawing should be prepared with every stone shown and numbered upon it.

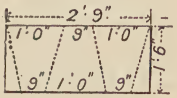
Stone over 6 feet in length may be kept separately and

should be billed with the length stated. When hoisted more than 40 feet it should be mentioned and the height stated.

Each stone must be taken separately, the cubical contents being ascertained firstly, and the labours taken lastly. Ashlar work, however, is usually taken, including all labours, in beds and joints, either by the foot superficial, stating the average thickness on bed or by the foot cube; but in the latter case the face will have to be measured separately and described as worked, whether tooled or otherwise, whereas in the former this is obviated by including it in the description.

In measuring block-stone, take the full dimensions of the stonework as it comes to the banker. Adopt a uniform method in taking the dimensions. The usual way is to take, firstly, the length; secondly, the height; and lastly, the depth in the wall. In cases of irregular pieces of stonework, the dimensions must be taken of the smallest rectangular block out of which the said stone can be cut; consequently it is evident that were every such piece of stone cut in this way there would be considerable waste. This, however, is not always the case, as a clever mason will consider before cutting the stone how he can economise it by sawing two or three irregular pieces out of one stone, and this is easily perceived in the case of arch stones, where the several stones would be measured the full size, and the *oblique* surfaces taken as sunk work, as will be hereafter explained. Take the example shown in Fig. 13; here we have three arch stones, which, taking the largest dimensions for the measurement of each stone, would be, presuming the thickness to be 12 inches,

Fig. 13.



3.	1·0			
	1·6			
	1·0		4·6	Cube stone.

But looking at the sketch, it is evident that the three stones could be cut out of a single block 2 feet 9 inches long,

2·9 1·6 1·0	4·2	Cube stone.

and that a saving would be effected by the mason to the extent of over 4 inches. Still, however, the former is the method which is carried out, and it would not be wise to advocate any other course. It is usual to measure stonework under 3 inches thick at per foot superficial, stating the thickness.

The following are the descriptions of the various labours executed on stonework; all are measured by the foot superficial:—

Plain work consists of the removal of the irregularities of the stone with the least possible waste of material labour, so as to obtain what the term implies—a plain face, or even surface.

Sunk work is formed by working below the flat surface of the plain work, as in rebates, weatherings, sinkings, &c., and it may be either straight or circular, but when circular it should be kept separate from the straight, and described as:—

Sunk work circular.—Fig. 14 is a sketch of the latter.

Circular work comprises the labour to concave and convex surfaces, such as to circular soffits, shafts of columns, and the like.

Circular sunk work consists of the labour required to form circular sinkings as distinguished from straight sinkings.

Fig. 14.

Circular circular work, or spherical work, as it is sometimes called, comprises the labour in forming niche heads, domes, and the like, being circular on plan and circular in elevation.

Moulded work comprises the labour in forming mouldings in stonework, and may be either straight or circular; where the latter, as to bases to columns and over arches, it must be kept separate from the straight.

It has been thought necessary to give the foregoing definitions for the benefit of those readers whose experience of the

subject has been insufficient for them to find them out practically. Hereafter will be found the method of measuring them by a series of examples; such being, it is considered, of greater advantage to the student than simply defining certain rules, and leaving him to carry them into practice.

Note.—It is always understood that "hoisting and setting" is to be included on each of the several items for the stonework; and in the case of Portland and other stones it is included in the cube blocks of the stone; and in the latter case all stonework more than 40 feet above the ground must be separate from that below that height.

Also, any stone which exceeds 6 feet in length must be kept separate from the general item, and be described as scantling lengths, and the different sizes stated.

Granite is measured in a similar way to stonework, except that beds and joints are all measured, instead of one for each stone (see page 52).

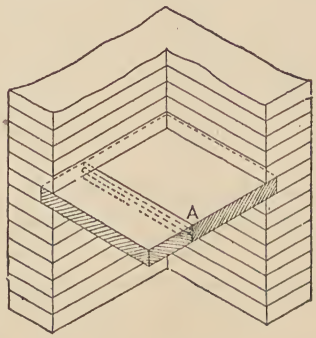
Yorkshire Stone.

In proceeding to treat of the several kinds of worked stones, Yorkshire stone will be first dealt with. The measurement of this stone in London varies from that of the other stonework, inasmuch as, in many respects, it is customary to combine the material and labour in the one item, instead of keeping them separate, as explained of stonework in general. This arises in great measure from the fact that the labour executed upon the stone is, in the majority of cases, worked at the quarries, and the material sent up to London in a finished state, ready for setting. And, moreover, this description of stonework occupies such a limited and ordinary position in a building, that any further detail than that usually given by quantity surveyors would be unnecessary. Of course, where used to any large extent, or where it occupies the positions now taken up by the stones in more general use, viz. in walling, &c.—as, for example, Portland or Bath stones—it would have to be measured in the same way as these stones, as will be explained hereafter.

Paving.—Take the length by the width, and state the thickness, and the description of the labour executed upon the stone, whether tooled or otherwise. State also if laid in regular

courses, and if bedded and jointed in mortar, cement, or as the case may be. Where the plan is irregular, and it becomes necessary to cut the stonework to fit against splays, or irregular projections, it will be necessary to measure the cutting separately. This is taken by the foot run, and described as "cutting and waste to 2½ inches York paving," stating the thickness. No allowance, however, is made in the superficial area of the paving to meet such contingencies, the *net* surface only being measured, the additional cost being provided for by the item for "cutting and waste." Any circular cutting

Fig. 15.



should be kept separate from the straight. Number any holes for pipes, &c.

Landings are measured similarly to paving, and remarks thereon will apply here. The student will have to include in the dimension for the length or width the portion tailed into the wall, as in sketch, Fig. 15. In the description state whether both faces are worked, and, if so, the nature of the work on each face, as it is frequently the case for one face to be rubbed, whilst the other is only tooled. Cutting and waste would be measured as described to paving, and any rubbed or tooled edges would be taken in the same way. Where the thickness of the landing exceeds 6 inches, it is customary

to take the edges by the foot superficial. Joggle joints (Fig. 15 at A) are measured by the foot run, and described as "joggle joint and cement to 4-inch landing," or as the case may be, stating the thickness of the landing. Any circular cuttings would have to be kept separate from the straight, but if preferred may be taken with the same, and a second dimension taken for the extra labour in forming circular cutting, beyond the price allowed for the straight. The former is thought to be the better plan of the two, however, and one that is more in vogue. Number all mortises for rails, newels, &c., and state whether they include "running with lead" to the rails or newels when they are fixed, though the labour in fixing the same would of course be included in the Smith, the lead, however, being sometimes taken with the mortise.

It should be remembered that when the length of a landing exceeds 6 feet, or the area of any one stone contains more than 30 superficial feet, it must be kept separate and specified accordingly.

Hearths.—In measuring hearths at per foot super take the full dimensions, and specify the thickness of the material. State whether rubbed, or otherwise, and number the notchings for the chimney-pieces, stating whether single or double.

Shelves, &c., are measured in a similar manner to the foregoing, including the cutting and pinning to walls—all worked edges, &c., being taken as described to landings.

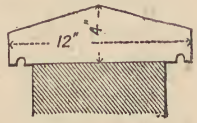
Curbs, Copings, &c., are measured by the foot run, stating the length, and giving scantlings, the largest dimension being taken each way. Specify the nature of the workmanship, whether tooled, rubbed or otherwise; and in the case of copings, it is always preferable to give a sketch in addition to the description. Thus sketch Fig. 16 would be described as—

20·0	12 in. × 4 in. tooled, twice-weathered, and throated on both edges, York coping, as sketch.

Some surveyors number the joints to copings, curbs, &c., but

as it is an understood fact that one joint is allowed to every 3 feet of stone, it is often considered unnecessary to number them, and accordingly they are included in the one item with the stone. It will, however, be necessary to number all cramps, plugs, &c., stating whether galvanised iron or otherwise, and including running with lead. Also specifying the length of the same, and if plugs are single or double. Where angle stones occur they must be kept separate from the straight, and specified accordingly.

Fig. 16.



Steps are measured by the foot run, stating the length with scantlings, and giving description of the work. For the length include the portion pinned into the wall; and where there is more than one step, take a running dimension the length of the step, for the labour in forming "back joint" or rebate.

Risers are also measured in this way:—Enumerate the "fair ends" and the "ends cut and pinned to wall in cement"; and also number all mortises for iron balusters and newels, as described to landings, and also any mortises for door posts.

Thresholds are measured in the same manner.

Sills.—Measure by the foot run, taking the length of the sill, and state the width and thickness. Describe the nature of the work on the same, whether tooled, weathered, and throated, or as the case may be. Number the "fair ends," the "ends cut and pinned to wall," and also for "bedding hollow and making good to sills."

Sinks are usually numbered, the dimensions being given, including the portions pinned into the wall. State the thickness or total depth of the sink; and some surveyors, in addition, give the depth of the sinking in the stone, though this course is exceptional. Take the labour to cutting and pinning to wall in the manner already prescribed for other work, viz. by the foot run. Should the sink have one or more rounded corners, number them; and also enumerate the rebated hole for trap. Stone bearers to sink would be also measured by

the foot superficial. Stone sinks are not very sanitary and are not much used nowadays.

Sink-stones are also numbered, stating the sizes and the thickness of the stone, and the number of holes, and whether dished or otherwise.

Templates are numbered, giving dimensions and stating how worked, whether tooled or otherwise; also whether bedded in cement.

Portland, Bath and other Building Stones.

Portland, Bath and other building stones are in more general use on account of being better adapted for building purposes, and being capable, owing to their texture, of receiving a greater amount of decorative treatment than the stones already mentioned.

In dealing, then, with these stones, it is customary to take the cubical contents of the stone first, and then the various labours executed upon it, keeping the stone and labour separate. There is, however, an exception to this rule in the case of ashlar work, which is measured by the foot superficial, including all beds and joints, stating the average thickness of the stone, as shown in the Table. With this exception, the stonework must be measured by the foot cube, and the labours upon the various faces taken separately, according to the execution. It is better to measure the labours in a particular order, and it is recommended that the inferior be taken first, beginning with the half-sawing, then taking the beds and joints, plain face, sunk face, moulded face, &c. Such a system enables the student to find any dimension afterwards without difficulty. Commence at the lower portion of the house, and work from left to right, as recommended in "Bricklayer." All stonework over 3 inches thick to be taken at per foot cube. Proceeding, then, to the measurement of the stone, it is also advisable to keep to one uniform method of taking the dimensions of the several blocks to obtain the cubical contents. As has already been observed, all labour and material in hoisting and setting the stone is included in the item for the cube stone. Where the stonework

is raised above 40 feet from the ground, it must form a separate item from that below that height.

Already, on page 45 have been given the definitions of the ordinary labours upon stonework, and the endeavour will now be made to explain the methods of measurement and to give examples in illustration.

As before observed, the stone is to be measured as it is actually intended to be worked, and the net surfaces for the labour only to be taken. The labours will be detailed in the order already prescribed.

Half-sawing is taken upon all sides of the stone upon which no other labour is to be executed, all other labours including this item. It is generally applied to the backs of stone, which would require no additional labour, but it must also be taken on every side when the stone is laid upon or against brickwork. Of course when certain faces are left rough as they come from the quarry, no sawing or other labour would be taken.

For the instruction of those who may be yet quite novices in quantity surveying, and who consequently need information not necessary to the more advanced, it may be mentioned that by taking half-sawing to each stone, this labour is equalised upon the several stones which are sawn, as the sawing itself would apply to two stones, both being sawn at one and the same time. After the whole of the half-sawing, however, is brought into the abstract, it may be divided by two, and billed as "sawing," though many surveyors still keep it and bill it as "half-sawing." The former is perhaps to be preferred, as sawyers are paid according to the amount of the "sawing," not "half-sawing," which they execute. The point, however, is unimportant.

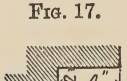
Plain Work in Beds and Joints is taken to stones laid upon or against other blocks of stone; otherwise, as has just been observed, they would be taken as half-sawing. Take as an example the case of a stone quoin to a brick building, the beds of which would be taken as plain work in beds, the stones being laid one on another, whilst no joints would be measured,

the ends being simply measured as half-sawing. Should however, the quoins be set against stonework, as in the case of a stone building, the joints would have to be measured similarly to the beds of the stone, and abstracted with that item as shown in the Table. Some surveyors measure only one plain bed and one plain joint to each stone, with certain exceptions (piers, pilasters, columns, &c.), but it is thought to be a much better plan to measure the whole of them, and state in the bill that this has been done. When the work, however, is continuous, it is customary to allow for joints to every 3 feet of stone only.

Plain Face is taken to all external faces of the stonework which are not otherwise worked. It is also taken to the faces of stones, where it is necessary to be executed for the purposes of setting out other work. In cases of elaborate detail this is frequently the case, and also in tracery.

Sunk Work is taken where it occurs; and must be described as it is executed, whether rough sunk, sunk work in beds and joints, sunk work in rebates, in weatherings, &c.; and if circular it must be taken separately. Measure the whole of the surface of the sinking, that is, take the girth. In the case of a rebate, as Fig. 17, the dimension for the width would be 6 inches, and the ends (if any) would be numbered. No deductions would be taken to any joints which might occur, and the plain faces to top and side would be measured the full width and height of the stone, the rebate being executed afterwards. This description of work is further explained in the examples hereafter given.

Fig. 17.



Moulded Work is measured by the foot superficial where the girth is more than 6 inches. When 6 inches or less it is measured by the foot run, taking the length by the girth, care being taken to add for all returns to the length. Girth the work for the width, but simply the moulding, the weathering being taken as sunk work and not moulded—the moulded being of greater value.

Grooves, Throats, Rebates under 3-inch girth, chamfers,

splays under 3 inches wide, reeds, flutings, joggle joints, cutting and pinning to landings, &c., &c., are measured by the foot *run*.

Number **chimney-pieces**, giving full description of workmanship and material, though many surveyors prefer to measure plain chimney-pieces by the foot superficial taking labours to edges, and numbering rounded corners. If numbered, state the prime cost value, exclusive of the fixing.

Paving, Landings, &c., would be measured as described for York stone.

Numbers.—Enumerate all mortises for door posts, balusters, iron railings, cramps, plugs, and dowels; also all cutting and pinning to ends of steps, notchings, letting in coal plates and air gratings, sink stones, sinks, pipe holes. Also all mitres, stating whether internal or external, and giving the girth of the mouldings, &c., to which they refer; stops, whether to mouldings, chamfers, &c., stating size and whether square, splayed, moulded, or as the case may be. Also number any items for carving, &c., as shown in the accompanying Table. In taking cramps and plugs, state the sizes and the metal, which may be reduced to weight; the labour of letting in and running with lead being taken separately.

Carving.—Measure strings, parapets, or where the work is continuous, by the foot run. Number all single items. Examples of different descriptions of carving are given in Table V.

In conclusion, it may be said that, if the description of any particular class of work has been omitted, it is believed that the reader will be able, from the general remarks which have been made, to apply the rules laid down to each individual case; but at the same time it is thought advisable to give a few general examples for the reasons already stated.

In prefacing Table V. it should be observed that therein are laid before the reader briefly the various descriptions which customarily come under the notice of the quantity surveyor, but of course there will be many others, every job varying in some particular; but probably sufficient has been

given to illustrate the principle of the measurement of stone-work.

Table V.

This Table has a double use; it shows the order of Abstracting and Billing this Trade and the method of Measurement.

Local Stone Walling.

Rubble stone in walling in random courses in foundations, well bonded and well flushed with mortar and grouted with lias lime and sand every three courses—average 2 ft. thick	At per yard super.
Ditto above foundations, average 18 in. thick, ditto	,,
Extra to rough hammer-dressed arches 16 in. high, with radiating joints	At per foot run.
Ditto labour to external quoins	,,
Ditto internal ditto...	,,
Ditto to forming openings for air gratings (12 × 6) in 18 in. wall	At per number.

Yorkshire Stone.

Tooled paving, laid in regular courses, and bedded and jointed in cement	At per foot super.
Ditto shelves	,,
Rubbed hearths	,,
Landings tooled one side	,,
Landings rubbed one side, tooled the other side	,,
Tooled steps and risers to specified sizes, including tooled edges	At per foot run.
Solid rubbed steps	,,
Feather-edge tooled coping, set in mortar and throated, including all joints	,,
Weathered, throated and rubbed window sills ...	,,
Rubbed curb	At per foot run.
Cutting and pinning to 3-in. landing in cement...	,,
Labour to back joint	,,
Ditto to fair edge to 4-in. landing	,,
Ditto circular ditto ditto	,,
Joggle joint and cement to 4-in landings	,,
Tooled templates and setting in cement	At per number.
Ditto corbels for plates pinned in cement	,,
5-hole dished sink-stone	,,
Tooled and dished sinks, with rounded corner, and hole cut and rebated for 2-in. trap	,,
Ends to steps cut and pinned	,,
Fair ends to steps	,,
Quadrant ditto	,,
Extra to corner stones in coping...	,,
Mortise holes	,,

TABLE V.—*continued.*

Ditto and lead...	At per number.
Rebated holes for coal plate...	,,
Double notches in hearths	,,
Plain joints and lead plugs to steps	,,
Caulking holes and lead for gratings	,,

PORTLAND, BATH, AND ALL BUILDING STONES.

Stone, including waste, hoisting and setting ...	At per foot cube.
Ditto ditto in 6-ft. lengths	,,
Ditto ditto in 10-ft. lengths	,,
Ditto ditto above 40 ft. from ground	,,
Sawing	At per foot super.
Plain work in beds and joints (all faces measured)	,,
Circular ditto	,,
Plain face	,,
Circular ditto	,,
Rough sunk work	,,
Sunk work in beds and joints	,,
Ditto in arch stones	,,
Sunk work in rebates for frames...	,,
Ditto rubbed	,,
Ditto ditto circular	,,
Circular face to shafts of small columns	,,
Circular circular plain face	,,
Moulded work in cornices, &c.	,,
Circular ditto	,,
Ditto ditto in small caps and bases	,,
Circular circular ditto	,,
Portland stone ashlar, average 6 in. thickness (on bed), including bonders, joints, and faces	,,
Groove for iron tongue	At per foot run.
Ditto for iron frame to revolving shutters... ...	,,
Ditto for lead flashing and burning in	,,
Sunk splay, 1 in wide	,,
Sunk rebate, 3 in. girth...	At per foot run.
Stop chamfer, 2 in. wide	,,
Mouldings under 6 in. girth (take smallest scantling first)	,,
Stopped ends to sinkings	At per number.
External mitres	,,
Internal mitres	,,
Splayed stoppings to 2 in. chamfers	,,
Moulded ditto ditto	,,
Mitres ditto ditto	,,
Stopped ends to moulding 9 in. girth...	,,
External mitres ditto	,,
Internal mitres ditto	,,
Intersecting mitres ditto	,,
Returned, mitred, and stopped ends to ditto ...	,,

TABLE V.—*continued.*

Housings for ends of steps 14 in. × 16 in. ...	At per number.
Fair sinkings, 2 in. wide, 3 in. high, and 2 in. deep, to form dentils	„
Ditto 2 in. × 6 in. × 4 in. deep, to form small moulded trusses in cornice	„
Chimney-pieces, with full description or P. C. price	„
Setting to chimney-pieces	„

LABOUR: WORKING AND CARVING, INCLUDING BOASTING, FOR DITTO.

Scroll ornaments in panels, 18 in. × 9 in. extreme size, as sketch	At per number.
Quatrefoil sinkings, 8 in. × 8 in. and 1½ in. deep, as sketch	„
Head to keystone, 12 in. × 9 in. on face, as sketch	„
Truss 12 in. face, 9 in. profile, and 2 ft. high, as sketch	„
Terminal 3 ft. high and 2 ft. 6 in. wide, as sketch	„
Caps to cols. 6 in. diam. at necking, and 12 in. high, in bold relief, including moulded abacus and necking	„
Ditto ¾ columns, and ditto ditto	„
Ditto to pilasters, 18 in. wide at necking and 9 in. high with two 10-in. returns, in bold relief ...	„
Carved boss terminations, 5 in. × 5 in. to moulded string	„
Ditto 4 in. diameter on face of moulded string...	„
Enrichment, 9 in. high in cornice, in bold relief, as sketch	At per foot run.
Mitred angles to ditto	At per number.
Stopped ends to ditto	„
Perforated ornamental parapet, 10 in. high, through 6 in. stone	At per foot run.
Cut groove for flashing and burn in	„

EXAMPLES OF MEASURING STONEWORK.

SPANDREL STEPS.—FIG. 18, p. 58.

There are several methods of measuring spandrel steps, but it is thought that in most general use is to take them as follows: Measure from out to out for the length, including the portion pinned into the wall; for the breadth, take from the edge of the nosing to the soffit; and for the height, take the dimension from top of step to soffit. This divided by

2 will give the cubical contents of one step. The extreme dimensions of the stone are shown by dotted lines. Spandrel steps are measured in this way, as two steps can be cut out of a rectangular block of the dimensions given.

½	5·0	
	1·4	
	9½	Portland stone step.
½	1·4	
	9½	Half-sawing to one end.
	5·0	
	1·2	Plain face to top.
	5·0	
	1·3	Add soffit.
	·6	
	·6	Add front of step pinned into wall.
	5·0	
	4½	Sunk work in rebate.
	4·6	
	6	Add to front (stopped).
	1·0	
	4	Add end.
	5·7½	
	4	Moulded work to front and return.

Plain Face.

Tread, &c.	1	0½
For rebate		1½
	1	2

Sunk Work.

Front	1	½
Do.	1	½
Back	1	½
	4	½

Sunk and Moulded Work.

Front	4·6	
Return	1·1	½
	5·7	½

No. 1 mitre to 4-in moulding.
No. 1 stopped-end ditto.
No. 1 mitred and returned end ditto.
No. 1 step cut and pinned to wall.
No. 2 mortises for balusters.

Should the moulding not be returned to step, the end would be taken as plain face. The soffite of spandrel winders would be measured as circular plain work.

FIG. 18.

SPANDREL STEPS.

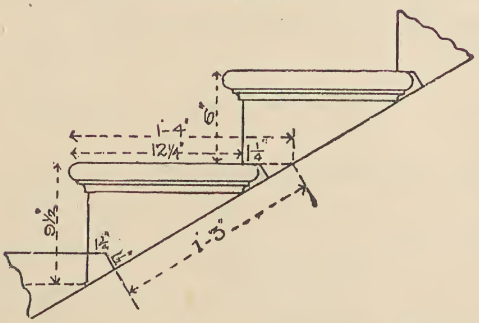
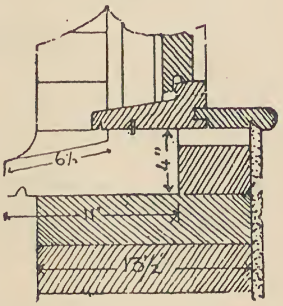


FIG. 19.



WINDOW SILL—FIG. 19.

4·0			
·11			
·4	Portland stone sill.		
4·0		Bed	·11
1·3	Half-sawing.	Back	·4
			1·3

2/	·11	
	·4	Add ends.
	4·0	
	·10	Plain face.
2/	·4	
	·2	Add ends.
	4·0	
	·6½	Plain face sunk in weathering.

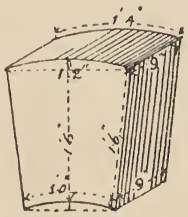
·4
·4
·2
·10

No. 2.—Stops to weathering.

4·0	Groove for tongue.	
4·0	Throat.	

ARCH STONE—FIG. 20.

FIG. 20.



1·2		
1·6		
·9	Portland stone.	
1·2		
1·6	Half-sawing to back.	
·9		
1·6	Plain work in one joint.	
·9		
1·6	Plain work, sunk ditto.	
1·4		
·9	Circular plain work in bed (at top).	
1·2		
1·6	Plain face (front).	
1·0		
·9	Circular ditto (to bed).	

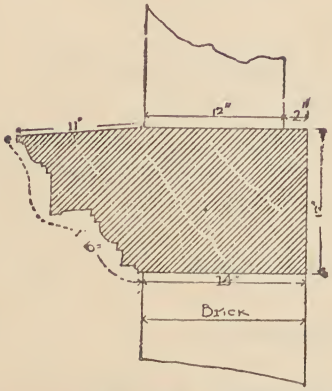
CORNICE—FIG. 21, p. 60.

3·0		
1·0		
2·1	Portland stone in cornice.	
		Back 1·0 Bed 1·2
3·0		
2·2	Half-sawing to back and bed.	2·2
3·0		
1·2	Bed at top (plain work).	
2/ 2·1		
1·0	Joints (plain work).	
3·0		
·11	Plain sunk face in weathering.	
3·0		
1·10	Moulded work (face of cornice).	

Cramps and mortises for same which are not taken in the above would follow here.

FIG. 21.

CORNICE.



Before concluding the trade it has been thought advisable to contrast the English custom of measuring with that of the Scotch.

The annexed form is given for Scottish readers who are interested in the subject, and also for those English readers who may have business with our neighbours "over the border." Items are only mentioned therein as to which there is a difference of measurement. As will be observed, no remark has been made on local rubble-stone, the measurement of which is also spoken of,* as it must necessaaily differ in many respects from the rules which have been laid down, it being so entirely dependent upon custom.

The following is quoted from the *Standard Method of Measurement of Building Works*: "Stone shall be measured the smallest rectangular cube from which it can be obtained. Where arch stones are required to be set with the quarry bed horizontal they shall be measured as out of blocks sufficiently large to obtain this result. Fractions of an inch, if half an inch or over, shall be measured as a whole inch. Those less than half an inch shall be neglected."

An alternative method of measuring stonework as including all labours is sanctioned by the *Standard Method of Measurement of Building Works.*

* Readers may be reminded that in most examinations the rule is for "the measurements and pricing to be in accordance with the English method."

TABLE VI.

DESCRIPTION.	METHOD OF MEASUREMENT.	
	SCOTCH.	ENGLISH.
BRICKWORK.		
Brickwork in partitions, gables, and party walls.	At per yard super, deducting only for voids, but not for fire-places, vents, or window dressings.	At per rod of 272 ft. super of 1½ brick thick; the brickwork, where above ½ brick thick being reduced to this standard. Half-brick partitions at per foot super. All openings are deducted, including the fire-places, but not the flues, the extra labour in forming them being taken as an equivalent for the saving in brickwork.
Ditto circular on plan, or in arches and inverts.	Ditto, taking the largest size.	Ditto, taking the mean circumference.
Plumbing corners of external walls.	At per foot lineal.	Not measured.
Reveals of outside doors and windows.	At per foot lineal for extra labour.	Not measured in common brickwork. Measured in superior facings with the front.
Superior bricks for face work, pointing, and flushing for white-washing.	At per yard super.	At per foot super.
HEWN WORK.		
All hewn work, except stair-steps, plats, hearths, and pavements.	Charged for its additional value over price of rubble-building measured on exposed surface, and classed and rated separately, according to size of materials and kind of work.	Stone and labour measured separately, the stone being taken in one item, and the labours classified according to the execution.
Base courses, strings, belts, plinths, narrow copings, and blocking courses.	At per foot lineal, specifying breadth, thickness, and workmanship.	As above. Exception made with regard to Yorkshire stone, which is customarily measured according to Scotch method.
Sills, lintels, architraves, and mullions.	Ditto, ditto.	Ditto, ditto.

TABLE VI.—*continued.*

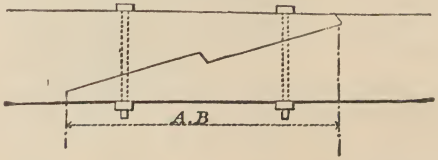
DESCRIPTION.	METHOD OF MEASUREMENT.	
HEWN WORK.	SCOTCH.	ENGLISH.
Rebates and corners	At per foot run, specifying size of stone and description of labour, and where part moulded, the girth of the plain work on the face, and to bottom of cheek of the ingoing to be stated, as well as the net girth of the moulding.	At per foot cube, labours separately.
Plain ashlar	At per foot super, allowing 3 in. for wall-hold at internal angles; 6 in. allowed for bevelled cuttings as at "pediments, skews, &c."	At per foot super, measuring the face and making no additions; cuttings taken at what they measure for labour, no allowance being made to the stone beyond what it measures.
Deductions for doors and windows in ashlar, with upstarts and pilasters of stone.	Full deduction of void and piers to be made less 1 ft. in width, which is understood as an "allowance for headers at ingoing in ashlar work. The price of ashlar to include for headers in general surface."	Full size of opening deducted.
Ordinary cornices and other running mouldings.	Measured from extreme points at per lineal foot, the extreme lengths of returns at external and internal angles being taken as an allowance for mitres.	Stone and labours measured as before stated, and the mitres numbered, stating the girth of the moulding.
Special cornices, where there are numerous returns and coping to chimney stacks (when broad stones are ordered)	At per foot super, and labour to edge at per foot run, stating girth and description of work.	Ditto, York stone, measured as before described.
Steps	Numbered.	At per foot cube, labour being taken as before; York stone at per foot run.
Paving	At per foot super, making an allowance of 3 in. for every lineal foot of cutting at angles or circles.	At per foot super; no allowance made in stone for cutting; labour to cutting being taken separately at per foot run.

CHAPTER VI

CARPENTER

THE one great difference in the measurement of the works of the carpenter and joiner is this :—That in the former you measure the extreme length of the timbers, including the tenons; whilst in the latter this is not the case, the net superficial quantity only being measured, the tenons being included in the price. In scarfings and laps to timbers, the length of the scarf or lap would have to be added to the net length of the timber, and where the ends of the timbers are bevelled take the *full* length (see Fig. 22).

Fig. 22.



Make no allowance for loss in sawing, but take the net scantlings. Where it is stated in the specification that the timbers are to bear the full scantlings when fixed, some surveyors make an addition to the material to cover the shrinkage. This is inadvisable, as the timber is presumed to be dry when fixed, in which case no allowance is necessary. Wherever an allowance is made, however, as it is difficult to get surveyors to give up their own adopted methods of measuring, it would be advisable to make a separate item of it, and describe it as an allowance to meet the shrinkage of timbers.

Dissect the work as much as possible, classifying it according to the nature of its execution, and describe briefly but fully the nature of the labour on the same. Where there is any labour executed on the material in carpenter's work: for example, to the timbers of an open Gothic roof, as planing, chamfering, &c., such labours would have to be taken out separately from the material and described as labour in planing to fir, oak, or as the case may be, or again, so many feet run of chamfer. In joiner's work the labour is generally described with the quantity, thus forming only one item instead of two or three, or even more, as is so frequently the case in the carpenter.

Where the timbers are *framed*, that is mortised and tenoned, they must be kept separate from the works that are only fixed, such framing necessarily entailing an additional amount of labour. In quantities all works are understood to be *fixed*, unless stated to the contrary, and would include the labour in nailing, laps, dovetails, &c.

Floors.—Commence measuring at the bottom of the house, taking first the sleepers, then the wall plates and ground joists; afterwards take the lintels and wood bricks, to the lowest story, and lastly the quarter partitions. Having finished one floor in this way, proceed to the next, but always complete the one floor before commencing the second; otherwise, omissions are apt to take place which, by adopting this rule, are easily avoided. Proceeding then with what are termed *Naked Floors* (the flooring boards being taken with the joiner), take, firstly, the sleepers and ground joists, the length by the scantlings. These do not entail so much labour as, and so must be taken separately from, the joists of the other floors, and will be described as fir framed in ground joists. All other joists are measured in a similar manner, taking care in each case to include the portions inserted in the walls, and they are described as fir framed in joists.

In double-framed floors it is customary to take the timbers bearing the greatest scantlings first. Where framed, as in

girders, binders, trimmers, &c., they must be kept separate and so described.

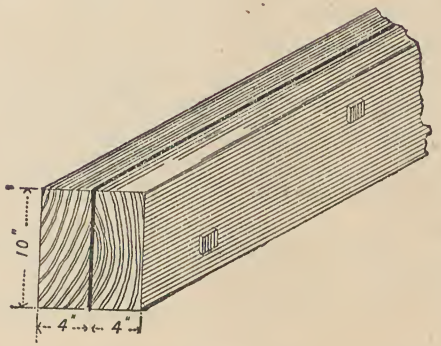
Herring-bone and other strutting between the joists is measured at per foot run, stating the scantling and the description with the depth of the joists, no deduction being made for the intervening joists.

Make the necessary deductions for fire-places, staircases, &c., as they occur, and add for the additional width of the trimmers and trimming joists in each case.

Measure the feather-edge **springer for trimmer arch** of fire place at per foot run, taking the length of the arch.

Girders sawn, reversed, and bolted, must be kept separate

Fig. 23.



from the ordinary fir girder, on account of the additional labour thereon ; and, again, greater labour still will be required where an iron flitch is inserted to fit the bolts, &c. (*Vide* Fig. 23). In the latter case the iron flitch is not measured in with the timber, the net amount of stuff only being taken.* Trussed girders must also be a separate item.

* Thus, presuming the length to be 16 ft., the timber would be measured thus:

2·	16·0		
	·10		Fir bolted in flitch girder.
	·4	8·10	

Oak trusses let into girders are measured by the foot run, and the labours, letting in screw bolts, fixing plates, straps, &c., are numbered ; the ironwork being taken off at the same time, and afterwards abstracted and billed with the Smith.

Bond timber is now seldom used in the provinces. In London it is forbidden under the Building Acts, being superseded by hoop iron or expanded metal, which is a great advance on the old system; the unsound uses of the old method in this particular are apparent. Where bond timber is adopted it is measured the length by the scantling, adding for the laps and dovetails, and is described in the bill as bond timbers. As they are, or should be, carried through the openings in the walls, and have afterwards to be sawn off to the size of the opening, it is customary to make a deduction equal to half the width of the opening only, in order to allow for the extra labour in the sawing and waste.

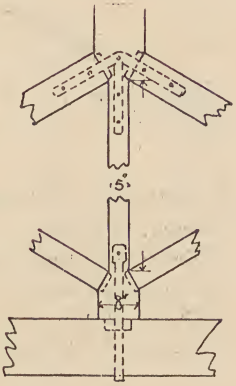
Plates and **lintels** are also similarly measured. Many surveyors include the wood bricks for fixing joiner's work under the same heading, though, to the authors' thinking, incorrectly, as the extra amount of labour in sawing the timber to the small sizes required and bedding same entails an additional cost. It is, therefore, preferable to number them and state the sizes. Breeze bricks are now generally used, however, for fixing purposes, and should be taken off in the Carpenter or Joiner as the case may be, and abstracted in the Bricklayer.

Roofs.—Where trussed, take the truss first. All timbers comprising the truss—as tie beams, king post, principal rafters, and struts—must be kept distinct from the other portions of the roof, and described as "fir framed in trusses" ; in each case take the extreme length of each of the timbers, including all the tenons as before stated. If the tie beam is scarfed, add the additional length of timber required for this purpose to the net length of the beam as in Fig. 22.

For the **king post** (see Fig. 24) the width must be taken where it is greatest, namely, below the shoulders ; sometimes a deduction is made (on one side only) between the shoulders,

the other side being allowed to pay for the cost of sawing and waste. But it is very unusual to make any deduction for this as the fragment cut away would probably not be of any value to the contractor. After the truss take the purlins, which are measured as above. Then take the common rafters, dragon pieces, &c., and lastly, the ridge-hips and valley-pieces, all to be reduced to the foot cube—this being the more uniform plan, though some surveyors take the last three items as a superficial dimension, and state the thickness in each case. At the same time as measuring the rafters and hips, take the ridge and hip rolls, where there are any, at per foot run, stating the diameter, and also state if spiked or otherwise.

Fig. 24.

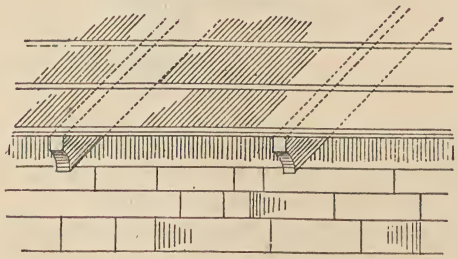


Take a running dimension of the hips and valleys to allow for labour and waste in cutting, and describe it as "cutting and waste."

The cleats to purlins are usually numbered.

Collars, curbs, pole plates, &c., are measured as "fir framed in roofs."

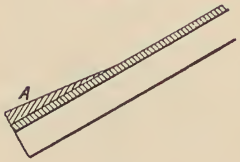
Fig. 25.



Take the cuttings to end of rafters, where visible, at per number, according to nature, giving sketch where necessary (See Fig. 25, where one kind of end is shown).

Measure the **ironwork** as it occurs, number the labour for fixing the same, and afterwards bill the ironwork with the Smith.

Fig. 26.

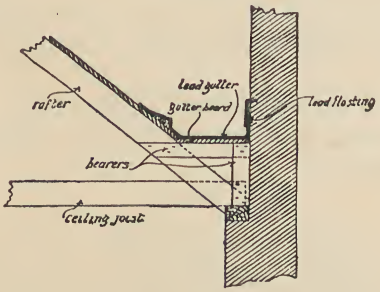


Boarding or battening for slate is measured the length by the breadth, from the extreme edge of the rafter up to the ridge, and reduced to the square of 100 feet superficial, stating the thickness, as shown in the Table. In the case of battens it will also be necessary to state the distance between the battens and their width.

Eaves boarding is measured by the foot run, and the width and thickness described.

Tilting fillets (shown in Fig. 26, and marked A) are also measured by the foot run, and the thickness stated.

Fig. 27.



It is advisable in the two foregoing items to collect the whole of the dimensions on each roof, on waste, so that one dimension only need to be brought forward.

Make all the deductions where they occur for trap-doors, skylights, and chimney shafts, and at the same time make the addition for the trimmers, &c., not forgetting to include the tenons in the length.

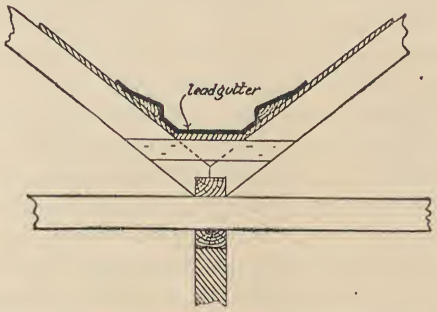
Gutter boards and bearers (shown in Figs. 27 and 28) are

measured by the foot superficial, taking the extreme length by the average width, but it is as well to state the greater and smaller widths, and show how you obtain the mean or average width on "Waste." State the thickness of the boarding. It is advisable also to state the sizes and particulars of the bearers when given in the specification, but this is so seldom done that surveyors, as a rule, do not specify them separately.

Where the bearers are specified to be framed, they must be described as such in the bill thus, "1-inch deal gutter boards and framed bearers."

Number the drips and cesspools, describing the latter as "extra to forming cesspool."

FIG. 28.



The following is the way these items usually appear in the Dimension book :—

Greatest width of gutter			2·0
Smallest „			1·0
			2)3·0
Average			1·6
30·0			
1·6	45·0	Inch deal gutter board and bearers.	
		No. 3 Rebated drips.	
		„ 1 extra to forming cesspool.	

It is perhaps better, before taking the gutter board and

bearers, &c., to take the trap-doors and linings where these occur. In so doing state the description of the linings, and in measuring them add to the length in the clear the thickness of the material for the framings. Collect the whole lengths of linings of each opening on waste, so as to have but one dimension for each, and they would have to be described thus:—"$1\frac{1}{4}$-inch deal wrought and splayed linings dovetailed at angles," or as the case may be. The frame may be taken at per foot run, and in describing same give the width and thickness, and state also whether dovetailed at angles.

For the trap-door take the width by the height, and state the thickness, and give the full description. Number the handles, bolts, and all fastenings appertaining thereto.

In measuring ceiling joists, take the length by the scantling, the same as stated for floor-joists, making the deductions for chimney breast, &c., where they occur, and adding for trimmers and trimming joists as described for roof.

Rough boarding to flats, &c., is measured the length by the breadth, and valued at per square, as shown in the Table. It will be necessary to state the thickness and quality of the material, with description, stating how laid, whether the edges of the boards are "shot," or otherwise. Where any cutting is required, as to splays, irregular walls, &c., take a running dimension of the length, and describe it as "extra to cutting and waste." Where a gutter is formed in the flat, it is measured at per foot run, and described as "extra to forming gutter in flat"; also, number the cesspools as extra, as before described to other gutters.

Firrings to flats, &c., are measured superficially, taking the area of the flat as shown in the Table.

Rolls for lead are measured at per foot run as shown in the Table, stating the diameter of the roll. Short rolls in gutters are generally numbered.

Boarding, where laid against walls or to ceilings, must be kept separate from that laid flat, more labour being entailed when upright or against ceilings, than when laid flat.

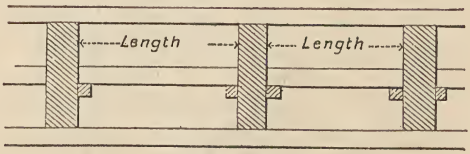
Battening to walls is measured superficially, the length by

the height. State the thickness of the material and the method of securing to the wall, whether plugged or otherwise, according to the nature of the backings.

To measure **sound boarding**, take the length by the width of the space between two joists, and multiply this dimension by the number of such spaces in the room where such sound boarding is required to go. It will also be necessary to describe the fillets which are included in this one item, and to state whether they are single or double. Some surveyors take the entire area of the room, and make no deduction for the joists, as before stated. Whenever it is done in this way it should also be stated in the bill that the timbers have been measured in. Fig. 29 illustrates this item.

Weather boarding is measured similarly to rough boarding,

Fig. 29.



stating whether edges rough, splayed, wrought, or wrought and beaded, &c., the net area of the surface only being taken.

Arris guttering is generally measured by the foot superficial. Some surveyors take it by the foot run when in small quantities.

Quarter partitions are measured by the foot cube, taking first the lengths of the several timbers, and then stating the scantlings. Take the timbers of the largest scantlings first, as the head and cill, including the portions let into walls, then the door-posts and head, the braces, and lastly the quarters, taking care to make the deductions for doorways where they occur. The cubes are then added together, and the sum of the whole is brought into the abstract in one item, and billed as "fir framed in partitions." Where the partition is trussed, it must be described as "fir framed in trussed partitions." The student must not forget, as previously stated, to include in both cases

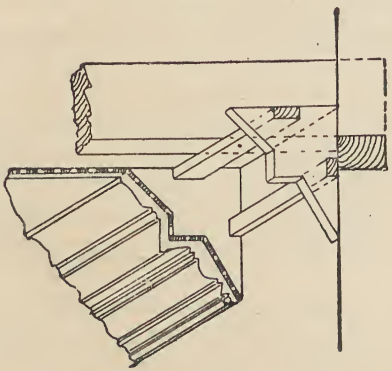
the tenons, and care must be taken not to omit any ironwork in connection with the partitions, as bolts, &c., which should be taken out at the same time, and afterwards billed with the Smith.

Oak templates are generally numbered, stating the dimensions each way.

Oak curbs are also measured by the foot cube; take the length by the scantling and add for the laps.

In measuring **bracketing to cornices**, &c., take the length by the girth of the moulding, making a superficial dimension, and specify the thickness of the deal used, and how secured to

Fig. 30.



the wall. To obtain the proper length, it will be necessary to make a deduction on the length of each wall of the width of the projection of the bracket, which will give the average; or the better way would be to deduct four times the width of the projection from the collected lengths of the walls of a rectangular room. For a sketch of ordinary bracketing, see Fig 30. If to circular ceiling, state so, and do not measure it twice, as some surveyors do, and call it all "straight."

Cradling for entablatures is taken in a similar manner—according to the thickness of the material.

All **angle brackets** are taken with the others, and afterwards billed again as *extra* only to angle brackets.

Angle staves are measured by the foot lineal, taking the net length.

Centering—to vaults, groins, &c. Take the length by the girth or circumference of the under side of the arch, which will give a superficial dimension. This is brought into the square of 100 feet, as stated in the Table, and is valued as such for use and waste. It is customary to measure centering to all vaults, although many of them may be of the same size, and the centering of one does for some of the others, in which the additional time in removing it for the other arches might be made an "extra" of. If centering is left in by the contractor, as in the case of some trimmer arches, &c., this should be stated in the bill.

Centerings to trimmer arches are measured the length by the girth.

The centres to windows it is advisable also to measure by the foot superficial, taking the girth by the width of reveal, and stating the nature of the curve, whether semicircular, pointed, &c.

Turning pieces to flat arches are taken at per foot run, stating the width of reveal, and including struts, or are numbered.

No centering is taken to the arches over fire-places, where chimney bars are provided they are not necessary. Where there is no chimney bar, they must of course be provided.

There is a difference of opinion as to the measurement of centering to arches of windows, relieving arches, &c., some preferring to take them at per number, and average the openings, keeping the different widths of soffit separate; so having one item for the half brick, another for the one brick, and so on—but, of course, keeping at the same time the different arches separate, thus, the semicircular from the Gothic, pointed, &c.

Labours.—All labours, on whatever class of work in connection with the carpenter, should invariably be measured at the same time as the material, otherwise it will be almost impossible to prevent inaccuracies occurring, and it will save a considerable

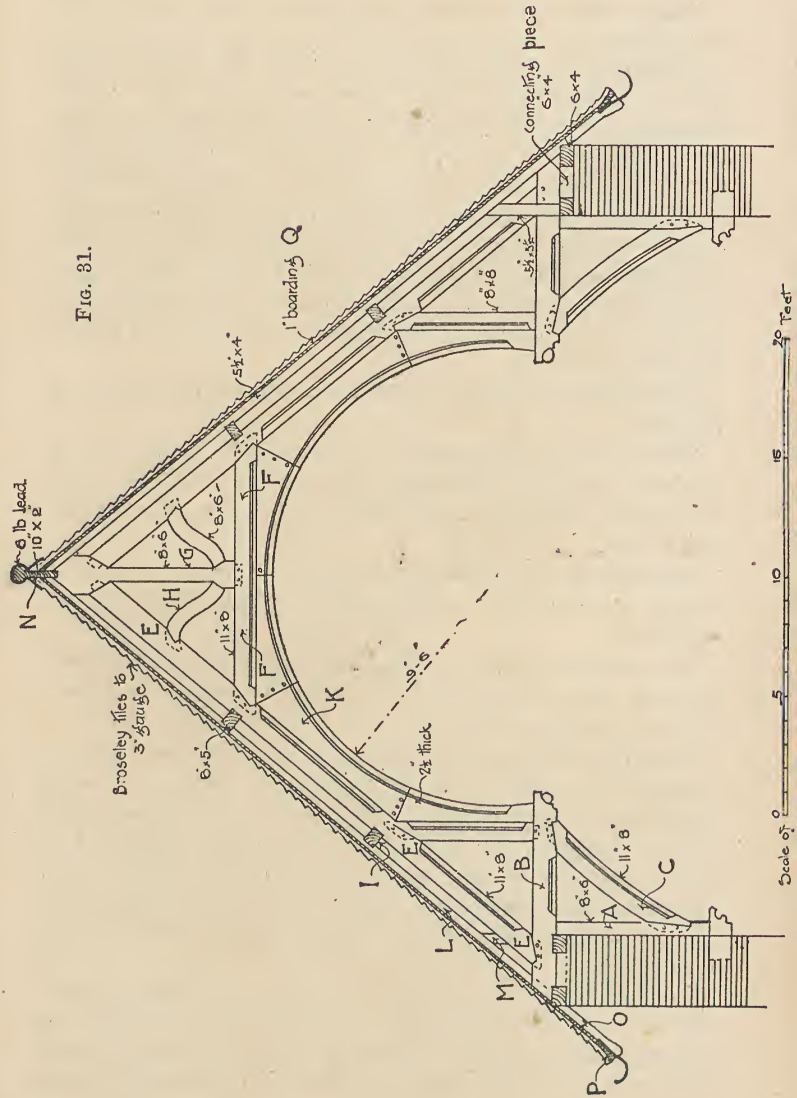
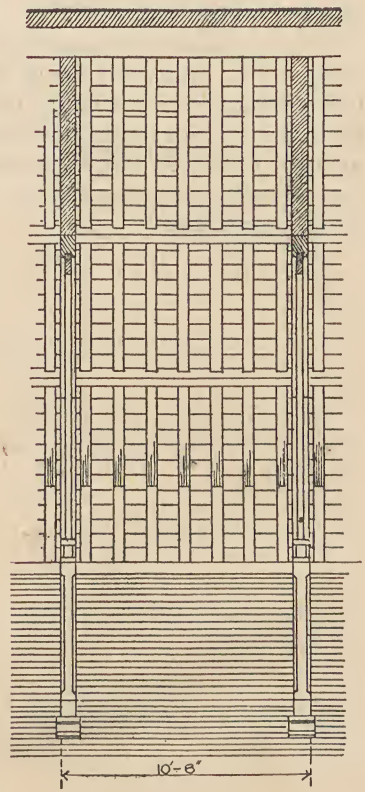

8 lb lead
10" x 2"
N
Broseley tiles to 3" gauge
8"x5"
E
H
G
8"x6"
11"x8"
F
K
5½"x4"
1" boarding Q
8"x8"
5½"x5½"
connecting piece
6"x4"
6"x4"
9'-6"
2½" thick
I
L
M
B
A
C
O
P
Scale of 0 5 10 15 20 Feet

FIG. 31.

amount of time. The labour on carpenters' work is generally confined to planing, splays, chamfers, rebates, &c., the sawing of timbers being of course always understood to be included in the price. Planing fir is measured by the foot superficial, also the labour to splays when over 6 inches wide. Chamfering is measured by the foot run, and the stops numbered according to the description, whether straight, splayed, moulded, &c., although this is more within the province of the joiner than the carpenter. Rebates, beading, &c., are also measured by the lineal foot.

Fig. 32.



It may perhaps be as well to observe, in concluding the Carpenter, that circular timbers, where small, are generally measured at per foot run, stating the scantlings, and if any labour is executed on the same it is as well to include it in the item and not keep it separate from the material, as stated for straight work, as the labour being circular it is better kept with the material, the builder being more able to form an estimate of its cost when knowing what it is for. Otherwise, in the case of large timbers it would have to be abstracted separately, and described as to circular work. All additional lengths for scarfing, &c., must

be added as before. It will be also necessary to state the radius. Number the framed and mitred angles where they occur, and also the intersections, stating sizes in each case as shown. When the curve is other than circular it must be so stated.

On page 77 is given an example of taking-off an open Gothic roof. The following Table, No. VII., will show under which headings each should be abstracted and billed, and it is suggested that the reader should square, abstract, and bill this example, which will afford him good practice. The pages 349 and 350, giving the abstract for an Entrance Lodge, may be found of assistance.

EXAMPLE OF TAKING-OFF OPEN GOTHIC ROOF.

Roof Truss and Roof Timbers in Pitch Pine.

2/2	10·8	
	·6	
	·4	Framed in plates
2/3	3·0	
	·6	
	·4	Do. in junction pieces

Truss Framed, Wrought and Stop Beaded.

A	...	2/2/	6·9	
			·8	
			·6	Framed in wall-piece
B	...	2/2/	9·0	
			·11	
			·8	Do. in hammer beam
C	...	2/2/	8·0	
			1·4	
			·8	Do. in curved strut
D	...	2/2/	6·9	
			·8	
			·8	Do. in strut
E	...	2/2/	25·0	
			·11	
			·8	Do. in principal rafter
F	...	2/	12·3	
			·11	
			·8	Do. in tie
G	...	2/	8·6	
			1·2	
			·8	Do. in king post

EXAMPLE OF TAKING-OFF OPEN TIMBER ROOF—*continued.*

G	...	2/	5·0	
			·6	
			·8	Ddt. king post
H	...	2/2/	3·6	
			·8	
			·6	Pitch pine in struts to king post
I	...	2/4	10·8	
			·8	
			·5	Fir framed in purlins
K	...	2/	1·9	
			6·6	Fir framed in wrought circular ribs $2\frac{1}{2}$″ thick and 9′ 6″ radius
K	...	2/	7·9	
			2·0	Do. add
K	...	2/	6·0	
			2·0	Do. add
L	...	2/7	32·6	
			·$5\frac{1}{2}$	
			·4	Do. framed in rafters
M	...	2/7	3·6	
			·$5\frac{1}{2}$	
			·$3\frac{1}{2}$	Add struts framed to rafters
N	...		10·8	
			·10	
			·2	Framed in ridge
O	...	7/2	·1	Ends of rafters cut to detail (see sketch)
P	...	2/	10·8	Tilting fillet $1\frac{1}{2}$″ × 3″
Q	...	2/	10·8	
			32·6	1″ boarding wrought one side

EXAMPLE OF TAKING-OFF OPEN TIMBER ROOF—*continued.*

Planing on Roof Timbers.

2/2/	6·9 1·8	1" boarding wrought one side
2/2	3·2 9·0	Do. add
2/2/	1	Ends of hammer beam cut to detail
2/2/	2·9	Do. beaded in small lengths
2/2/	2	Stops to small lengths
2/2/	8·0 1·4	Circular planing to strut
2/2/	8·0 1·10	Planing, *not* circular
2/2/	6·6	Bead to angle, *circular*
2/2/	2	Stops to angle
2/2/	6·9 2·8	Planing on strut
2/2/	5·6	Bead to angle
2/4/2	1	Stopped ends to angle
2/2	25·0 3·2	Planing to P. rafter
2/4	11·6	Bead to do
2/	16	Stops to bead

6
6
8
1·8

2/11 = 1·10
2/8 = 1·4
3·2

2/11 = 1·10
2/8 = 1·4
3·2
6·0
5·6
11·6

EXAMPLE OF TAKING-OFF OPEN TIMBER ROOF—*continued.*

2/	12·3		
	3·2	Planing to tie	
2/2	10·0	Bead	
2/	4	Stops to bead	
2/	8·6		2/8″ = 1·4 2/6″ = 1·0 2·4
	2·4	Planed face on king post	
4/	3·6		
	1·0	Do. add struts	
4/	3·6		
	1·4	Do. circular face on struts	
			2/8″ = 1·4 5 1·9
4/	10·8		
	1·9	Planing on purlins	
2/7	32·6		
	1·3	Do. on rafters	
2/7	3·6		
	1·3	Do. struts	
	10·8		
	1·10	Do. on ridge	
2/2	33·0	Labour to circular edge of $2\frac{1}{2}$″ rib twice beaded and tops chamfered	
2/2	4	Stops to circular bead on do.	

TABLE VII.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

Fir in plates, lintels	At per foot cube.
Ditto in ground joists and sleepers	,,
Ditto in girders	,,
Ditto ditto sawn, reversed, and bolted	,,
Ditto fitted and bolted to iron flitches	,,
Ditto, framed in roofs	,,
Ditto ditto in floors	,,
Ditto ditto in quarter partitions	,,
Ditto ditto in trusses	,,

TABLE VII.—*continued.*

Oak in templates	At per foot cube.
Ditto in curbs	,,
Follow in with all circular timber...	At per foot run.
Centering to vaults and arches	At per square of 100 ft. super.
Ditto to trimmer arches	At per foot super.
Ditto to segmental arches	,,
Ditto to semicircular arches	,,
Ditto to Gothic pointed arch...	,,
Ditto ditto with splayed soffits	,,
Close centering to flat-gauged arches, follow with various forms, segmental, circular, &c.	At per foot super.
$\frac{3}{4}$-in. battening, $2\frac{1}{2}$ in. wide, for countess slating	At per square of 100 ft. super.
$\frac{3}{4}$-in. rough eaves board	At per foot super.
Ditto ditto boarding jointed for slates	At per square of 100 ft. super.
Ditto ditto boarding edges, shot, and firrings for flat	,,
Ditto ditto valley boards...	At per foot super.
$\frac{3}{4}$-in. rough sound boarding, with 1 in. × $1\frac{1}{2}$ in. fillets screwed to joists	At per square of 100 ft. super.
Labour planing to fir	,,
Inch rough boarding	,,
Ditto ditto bracketing for soffit	At per foot super.
Ditto ditto gutter boards and bearers	,,
Ditto ditto weather-boarding, with splayed edges	At per square of 100 ft. super.
Ditto wrought ditto	,,
Ditto ditto one side and V-jointed batten boarding plugged to walls	,,
Inch deal matched and beaded boarding to ceiling	,,
Ditto deal wrought and ledged trap-door	At per foot super.
$1\frac{1}{4}$ ditto ditto and splayed linings dovetailed at angles	,,
Splayed cutting and waste to $\frac{3}{4}$-in. boarding ...	At per foot run.
Extra for groin point to centres	,,
Tilting pieces	,,
Springing piece to trimmer	,,
Labour to rebates	,,
Ditto to chamfer	,,
Turning pieces to arches $4\frac{1}{2}$ soffit...	,,
Stout rough fillets nailed to girders	,,
2-in. deal rounded roll for lead	,,
Herring-bone strutting	,,
$1\frac{1}{2}$ in. × 9 in. cut and stopped chamfered barge board	,,
4 in. × 10 in. circular wrought ribs to ceiling screwed up in two thicknesses, framed and chamfered on two edges	,,

TABLE VII.—*continued.*

Fencing, with full particulars as to size of rails, posts, palings, and distances of posts apart, &c., giving height of fence and posts	At per rod run of $16\frac{1}{2}$ ft.
Fir cleats to purlins	At per number.
Wood bricks (giving sizes), breeze bricks, or fixing blocks	,,
Cut ends to rafters	,,
Sprocket pieces, with sketch	,,
Extra only to labour in scarfings	,,
Notchings of centres for key-stones	,,
Hoisting and fixing trusses	,,
,, bell turrets and ventilators	,,
Rebated drips in gutter	,,
Extra to dovetailed cesspools in gutter	,,
Oak templates 2 ft. × 9 in. × 6 in.	,,
Mitred intersections of circular ribs, 4 in. × 10 in.	,,
Framed and mitred angles to 6 in. ribs	,,
Fixing screw bolts to flitches—*extra to*	,,
Ditto to principals	,,
Ditto straps with two bolts each	,,
Ditto king heads to trusses	,,
Ditto shoes to feet of principals	,,

It has been considered easier to keep this trade separate from that of the Joiner, although in small works this is not always done.

The *Standard Method of Measurement of Building Works* rules that in all cases scantlings of timber shall be stated and each scantling shall be given separately.

CHAPTER VII

JOINER AND IRONMONGER

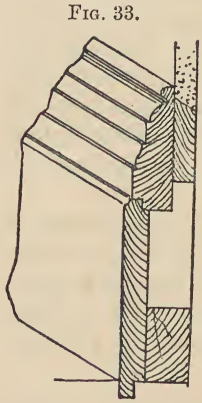
WITH the Joiner's bill is sometimes incorporated that of the Ironmonger. It has been thought advisable to keep the Carpenter and Joiner apart from each other, so as to make the subject less complicated than it otherwise would be. The great distinction between the two trades is, that whereas the former is engaged on what is commonly termed the carcase of the building, the latter is employed on the internal fittings and finishings. In the one case the labour would be ordinarily small in comparison with the material, whereas in the other the reverse is the case, and the labour consequently requires more minute description than in the Carpenter. The difference of measurement between them (see page 63) has already been stated, and it may be repeated that in the Joiner the net superficial quantity *only* of the material is measured (except in certain cases, which will hereinafter be referred to), all tenons, &c., being considered in the price.

In the Joiner, it is advisable to follow the same course of procedure as in the preceding trade—namely, floor by floor, completing one floor before the second is commenced. Begin with the flooring, then take the skirtings, next the windows and doors, staircases, &c., as will be shown, taking the ironmongery as it occurs.

Floors.—Take the length by the width from wall to wall (including skirting), and add for all the additional pieces of flooring, such as filling into recesses, windows, &c. Give the thickness of the boards, and a description of the material, with the method of laying same, whether straight joint, folding, dowelled.

or otherwise. It is also necessary to state the width, or gauge, of the boards, specifying whether batten, or as the case may be. Make the deductions for all projections, well-holes, &c., also for the slabs to fire-places, though many surveyors make no deduction in the latter case, but allow it as an equivalent for the additional labour in putting a mitred border to the slab; but where no mitred border is provided, they deduct the area of the slab. It is best, however, to make this deduction in either case, and then to take the border separately; but it having been already measured in with the flooring, it would only be described as "extra to glued and mitred border to $1\frac{1}{4}$-in. flooring," or as the case may be, the item being a "running" one, taking the extreme dimensions each way for the length; the width of the border, not being necessary, is not given, but the thickness of the flooring must be stated. Take a measurement where special features occur, as for sinkings for mats, &c., such measurements being described as "extra to sinking in floor for mat," or as the case may be; and if mitred border be provided round the same, take it as described to slabs.

Fig. 33.



Where the room is irregular, it will be necessary to ascertain the average size of the flooring, so as to arrive at the net area, and make an allowance for all irregular cuttings, taking the length by a width of 3 in. for the cutting and waste.

Skirtings.—Collect on "Waste" the lengths of the several walls, making the deductions for doors, chimney-pieces, &c., and bring the total length of skirting to each room, forward in one dimension only. It is customary to measure them at per foot run, stating the height, thickness, and the description. Also state if the backings, or grounds, are intended to be included in the one item. If the grounds be taken separately, they are measured by the foot run, stating the length only, and are described as "narrow skirting grounds." It is also

advisable to state how the grounds are secured to walls, whether plugged or otherwise. Number all the angles to the skirting, stating whether "mitred" or "tongued"; also the housings into architraves, &c., and any returned ends. These items should in each case be abstracted and billed immediately after the different descriptions of skirtings to which they relate, as by this means labour is saved and an estimate is the better formed of their value, as it can be easily seen to which they refer, and the amount of labour necessary in executing them. If billed among the "Numbers," it will be necessary to state the height and thickness of the several skirtings to which each of them has reference; also whether moulded skirting, or otherwise. In measuring skirtings it is always advisable to give a sketch (see Fig. 33) where it is anything beyond the common mould, and even then it is preferable, as, should it be able to be prepared without making a new moulding tool—that is, should the builder have the tool in stock, he will estimate less for it than where he does not know the character of the moulding, an addition always being made sufficient to cover the expense of a new moulding tool.

Sashes and cased frames are measured together as follows:—Take the measurement between the pulley styles, and add 4 in. on each side (being the width of the frame) for the total width. For the height, take from the top of the stone cill to the under side of the head of the frame and add to this dimension 3 in.—being for the head. This calculation would in each case be carried out on "Waste," so that the one dimension need only be brought forward for each sash and frame, thus:—

Width between pulley styles...	3·0
Add for frame, two 4 in.	8
Total width	3·8
Height between head and cill	6·0
Add for head	3
	6·3

3·8		
6·3	23·5	Deal-cased frames of 1 in. inside and outside linings, $\frac{3}{4}$ in. back linings, with parting slips and beads grooved and rebated together, oak 4 in. double sunk and weathered cills, and $1\frac{3}{4}$ in. deal moulded sashes, double hung, with patent sash-line, solid brass axle pulleys, and iron weights. The frames to be grooved all round for finishings.

It is always necessary that a full description should be given as above, stating the thickness and description of the sashes, and the description of sash line, pulleys, and weights. When they are to be glazed with plate glass lead weights will be required. It is also necessary to state whether the cill is oak or otherwise, and the labour on same, whether sunk, weathered, &c. The sash fastenings are taken separately and the description given.

Where the sashes and frames have *circular heads*, it is customary to measure the portion that is square (that is, up to the springing line) and to abstract it with the foregoing, but to take the circular head separately, measuring it as if square, taking the greatest dimensions each way, with the allowance for head and width as before expressed to ordinary sash-frames, and to make a separate item of it, describing it as "circular head to sashes and frames, measured square." Or another way is to measure the whole sash and frame as if square, and take the circular head separately, and describe as "extra only to circular head to sashes and frames, measured square." This is considered preferable, and it is so described to be taken in the Table. Where sashes and frames are *circular on plan*, it is necessary to take the girth instead of the net width, with the same allowances as for straight sashes; and they require to be separately described as "circular on plan," with sketch showing degree of curve in addition to the ordinary description. Should they be described as "*circular circular*," that is, circular on plan and circular in elevation, it will be necessary to keep the portion which is "circular circular" separate from that which is only circular, measuring as stated, to circular-headed sashes and frames; and they would consequently be described as "extra only to circular

heads to circular sashes and frames, measured square," and would follow in the bill immediately after the circular sashes and frames. Where the thickness of the several members of the frame, as hanging styles, parting bead, &c., are beyond the ordinary, it should be so stated in the description.

Where the sashes are fixed, they are measured similarly to those that are hung, the only difference being in the description.

French casements are measured the net dimensions of the casements exclusive of frame, and described according to the thickness and workmanship. Where the casements are rebated, the dimensions must be taken to the extreme of the rebate each way, and if hook rebates are required, this must be as stated. The frame would be measured and described as "cube fir in wrought, rebated, and staff-beaded casement frames," or as the case may be. Be sure in the measurement for the frame to add the tenons and horns. Transoms and mullions are also measured solid and described. Cills are taken at per foot cube. If patent or other water bar is specified measure it at the same time. State how the casements are hung, and generally describe the same fully. *Sashes fixed or hung on centres* with solid frames are similarly treated.

The method of measuring circular heads to casements is described hereafter, in treating of door frames on page 91.

Window Linings.—After the sashes and frames, proceed to measure the linings, taking them the net length shown, and adding for the passings, for the one dimension ; and the width forms the other. State the width and give description. The labour to the groove, when they are grooved, is generally taken separately. It will form a running dimension, the length being the same as that for the linings.

Window Boards are measured by the foot superficial, taking the length by the breadth ; and when they are grooved into the cill, the labour to groove should be taken separately, as described to the linings. The beads should also be in the description. If the cill be of oak, it must be described as "labour to groove in oak," as, necessarily, greater labour

would be entailed than if executed in fir. Give the description of the window board, firstly stating the thickness; and where the corners are rounded and returned, it is customary to number them as "returned and rounded ends to window board," and if the boards are notched, this must be stated in addition.

Where the window linings or window boards are on the splay, it will be necessary to keep them separate from those on the square.

The **framed grounds** are measured the extreme length each way, that is, taking the dimensions on the outer edge both for the height and width of the window; or another way is to take the *net* height and width of the jambs, and allow four times the width of the grounds to allow for the framings; both results being of course the same. The latter is believed to be preferable, the collections for length being made on "Waste," thus:—

Height of jamb	6·0
Ditto	6·0
Length of head	4·0
Framings, 4/4″ (grounds)	1·4
Total length	17·4

This is brought into the dimension column and the width stated. Also, specify the thickness and description, thus:—

17·4	
17·4	1″ × 4″ deal framed grounds.

Architraves.—Measure the architrave mouldings by the foot lineal along the outside edge and specify the girth of the moulding. (See Fig. 34.) The round of the moulding is taken along the outer edge for the length. Include all the mitres in the description. Some surveyors take the mouldings where over 4 in. girth by the foot super, but it is preferable to measure all by the foot run for the sake of uniformity. Any pateras at the angles or elsewhere must be numbered as extras only, as also plinths where they occur, as for example, to stop

Fig. 34.

the skirting where it projects beyond the face of the architrave. Should the moulding to skirting be carried round window to form architrave, as is sometimes the case, do not omit to take the additional mitres.

Window backs are measured the length by the height, the latter being taken from the floor to the under side of the capping. In addition to the visible length, it will be necessary to add the thickness of the framing on each side. Thus if the visible length of the back be 4 ft. 0 in., and the thickness of framing $1\frac{1}{4}$ in., we should collect on "Waste":—

Length	4·0
Two passings	$2/1\frac{1}{4}'' = \cdot 2\frac{1}{2}$
	$4\cdot 2\frac{1}{2}$

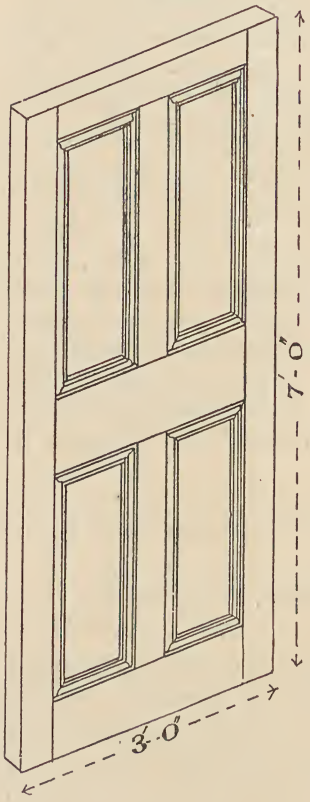
by which means we obtain the total length. State the thickness of the framing and give a full description of the workmanship. The capping is taken separately at per foot lineal, and described according to the nature of the work upon it. The following is an example of how these would appear in the Dimension-book, the length being ascertained on waste as above:—

$4\cdot 2\frac{1}{2}$ 1·6	6·4	$1\frac{1}{2}$ in. deal moulded and framed two-panel window back.
4·0	4·0	$1\frac{1}{4}$ in. deal beaded capping with moulded edge.

The elbows are measured similarly to the window backs, taking the extreme widths, including the passings, for the one dimension, and the same height as the back (viz. to under side of capping) for the other. The soffits are also measured the full dimensions each way. Describe how they are finished, whether splayed, plain, keyed, or framed in panels; and, if the latter, the number of the panels, and whether moulded or otherwise. The caps to elbows and clearing-pieces are numbered. The labour to splayed ends is measured at per foot run, as shown in the Table.

Boxing shutters are measured by the foot superficial, taking the height by the extreme width, including all the rebates. State the thickness of the shutters and description of framing; also state the number of heights in which they are hung, if more than one. Back flaps are also measured in this manner. Number all the ironmongery as it occurs; also the holes cut for the shutter bars.

Fig. 35.



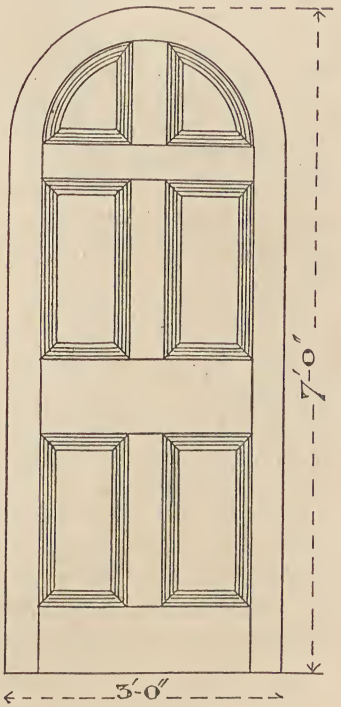
In measuring the back lining, add 2 in. to the height of the shutter for the length; take this by the width, and state the thickness and description. If grooved, take a running dimension of the groove for labour. Shutter boxes are measured the height by the width, including all the framings; and state the thickness and description, whether "proper" boxings or otherwise—proper boxings being wrought, framed, rebated, splayed, or beaded.

Sliding shutters are measured by the foot superficial, stating the thickness and description of the framing, and also the hanging, &c., as to sashes and frames. The flap to cover the same is measured by the foot run, if under 6 in. wide. Number the ironmongery.

Doors.—Measure the width by the height, stating the thickness of the framing and the number of the panels; also the mode of finishing, whether beadbutt, moulded, &c.; and if the panels are raised, or are completed differently from the

ordinary, it must be so described, as it is necessary, as before stated, that the description should be full and explicit. In all cases take the description from the specification, when working from one. Where the doors are double, and are hung folding, the width of each door must be taken to the extreme edge of each rebate. If the doors are hung with rising butts, state so, as it will necessitate the head-lining and the top rail of door being splayed, as shown in Fig. 35.

Fig. 36.



In measuring **ledged doors**, it will be necessary, in addition to the net thickness of the door, to state separately the number and sizes of the ledges, and to note whether the boarding is wrought, ploughed, tongued, and beaded, in which case they are designated as "proper ledged doors," such description rendering further description unnecessary. Should the boarding, however, be differently finished, it will be necessary to describe it as it is worked. Where the doors have **circular heads**, the course usually adopted is to measure them as square, taking the full height and width, but specifying them as "doors with circular heads" (Fig. 36). Gothic heads and heads with quadrant corners are similarly measured, but each kept separate and so described. A sketch is generally advisable in the two latter cases, as it greatly facilitates matters by the better exemplifying the true shape

and character of what is intended. Sash doors are measured as above, and it is customary to measure with them the shutters, where these are provided, taking the length by the height, including the rebates where any are provided, and describing the method of framing, whether bead-butt and square or otherwise. Where a rim is necessary for the support of shutters, measure it by the foot run on the outer edge, and describe it as "wrought, rebated, and moulded rim," or whatever it may be. After having completed the measurement of the door, take the hinges, locks, bolts, and fastenings, giving the sizes and description in each case, so that one door may be completed before commencing a second; and the same with the lifting shutters, numbering the stubs and plates, shutter lift, and thumb-screw fastenings. In the case of entrance doors, all the additional fastenings, as knocker, knob, door chain, &c., would be taken off with the door in like manner.

Where a number of doors occur of the same size, it will not be necessary to repeat the dimensions, but the number of times the item occurs should be placed to the left of the dimensions, as stated previously; but as it is advisable not to confound the articles on one floor of a house with those on another, they should be kept separate, and yet be included in the one dimension. To explain this, supposing we have seven doors of a given dimension (say 3 ft. by 7 ft.) on the ground floor, and an equal number of the same size and description of door on each of the second and third floors, this could appear in the Dimension-book in either of the following ways (the total of the doors would be 21):—

			A.
21/	3·0 7·0		2 in. deal four-panel square framed door.
			Or B.
3/7	3·0 7·0		2 in. deal four-panel square framed door.
			Or C.
7·7·7	3·0 7·0		2 in. deal four-panel square framed door.

Example A has already been explained; in example B, the line between the 3 and the 7 signifies that the latter figure occurs three times, and consequently denotes the multiplication of those numbers. In example C, the dots denote the addition of the numbers between which they are placed. Both the examples B and C frequently occur in taking-off quantities, B being used when the same quantity is repeated, and C more usually where different numbers of the same article are to be added. In the example given, B would be employed; but supposing the number of those doors on the 1st, 2nd, and 3rd floors to be respectively 10, 5, and 6, we should employ the mode adopted in example C, that of B being of course inapplicable; and the example A not being advisable except where the article is all on one floor, as previously stated.

In measuring the door frames, take the height of the door, and double it for the two sides, and include on each side the tenons into the head, and an additional 2 inches on each side for stubbing into the cill; add to this the width of the door, and twice the thickness of the frame, and an additional 6 inches for the horns. The whole of these dimensions must be collected on "Waste," and the total brought forward and the scantling stated with full description of the work. To give an illustration of the above method, take a door 3 ft. 6 in. by 7 ft. 6 in., the scantling of the frame being 4 in. by 4 in.:—

Height of door for one side ...	7	6
Ditto other side	7	6
Add for two tenons ... ...2/4″ =		8
Ditto two stubs ... ...2/2″ =		4
Width of door	3	6
Two thicknesses of frame ...2/4″ =		8
Extra width for horns ...2/3″ =		6
	20	8

20·8		
·4		
·4	2·4	Fir wrought in proper door frame.

It will be seen from this that the measurement of door

frames is similar to the measurement of the timbers in the carpenter's work, inasmuch as all tenons, &c., are added to the net dimensions. Some surveyors, for this reason, take it off and abstract and bill it with the Carpenter; but as it is actual joiner's work, being prepared at the bench, it is perhaps better to take it off with this trade, it being advisable always to affix the various items to the various trades by whom they are severally prepared. When the head is circular it must be kept separate, and described as "To circular head of door frame." Where there is a transom, it is measured in with the door frame (being, in fact, part of the frame) if it is similarly worked: if it is differently worked it must form a separate item, and is in this case better measured by the foot run. In either case, the tenons must be included in the measurement for the length.

Oak cills are measured and kept separate from the frames, and the description of the labour upon the same must be stated, whether wrought, weathered, framed, &c. In measuring them, take the length by the scantling, and bring all to the foot cube, the greatest dimensions being taken each way.

Jamb Linings, &c.—The following is the method of measuring jamb linings (see Fig. 35, page 90). Take twice the height of the door for the two sides, to which add the width of the door for the soffit, and add for the passings four times the thickness of the linings—thus, supposing the jamb linings to be 6 in. wide and $1\frac{1}{4}$ in. thick (door 7 ft. by 3 ft.), collect on "Waste":—

Height of door for one side...	7·0
Ditto other side	7·0
Width for soffit	3·0
Four times thickness of lining ($1\frac{1}{4}$ in.) for passings	·5
	17·5

17·5 ·6	8·9	$1\frac{1}{4}$ in. deal double-rebated and double-beaded jamb linings.

To obtain the width of the jamb linings add to the thick-

ness of the partition the thickness of the door grounds on "Waste," thus :—

Partition	$4\frac{1}{2}$
Two grounds	$1\frac{1}{2}$
	6

It will be necessary to describe the nature of the work whether single or double rebated, beaded, &c., &c. ; and where dovetailed or other blockings are provided for hinges and lock they should be included in the description. Where the linings are tongued to door frames, they must be kept separate from the other linings, and described accordingly.

Framed door-grounds are measured as follows :—To the total of the jamb linings add four times the width of the grounds for the passings, and state the thickness. Taking the example just given, and presuming the grounds to be 4 in. wide, we obtain :—

Jamb linings	17·5
Four times 4 in. for passings	1·4
	18·9

| 18·9 | 18·9 | × $\frac{3}{4}$ in. 4 in. deal framed grounds.

The labour must be described according to the nature of its execution.

Architrave mouldings are measured by the foot run, stating the girth and including all the mitres in the description, as explained to window finishings (see page 88).

Panellings and Dados.—Measure the dado by the foot superficial, taking the extreme length by the net height, and state the thickness. It will also require to be described, whether simply ploughed and tongued, wrought one side, or whether framed in panels, &c., &c. ; and if framed in panels, the nature of the framing. Also state the nature of the backings, and whether they are intended to be included in the one item. It is customary to measure base and surbase

mouldings, where over 6 in. girth, by the foot superficial—under that, by the foot run. State the nature of the moulding in each case, and girth for the width, including the rebates. Number the mitres, housings, &c. The plain plinth would be measured by the foot superficial, taking the extreme dimensions for length and height, including tenons and housings, the mitres, housings, &c., being numbered as described to skirtings. Where the dado, &c., are circular, so describe the several items, and keep the circular portions separate from the straight. Intersecting mitres should also be kept separate from the ordinary. Moulded plinths are measured the same as those described for the dado, taking the plain part first; the extreme length by the height, including housings, rebates, &c., the thickness and description being stated; also state whether backings are included in the one dimension, if not, they must be taken separately at per foot run, as described for skirtings. Girt the moulding for the width, taking the same length as to plinth—when over 6 in. girth, they are measured by the foot superficial—under that, by the foot run. Number mitres, housings, &c., and if the work is circular, describe it as stated for dado. If in hard wood, state if it is to be fumigated and wax polished.

Fig. 37.

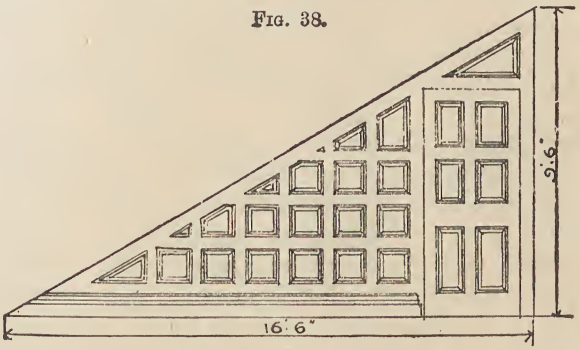
Pilasters (Fig. 37) are measured by the foot superficial collecting the round or girth of the pilaster for the width. Thus, if face be 10 in. wide, and the returns 4 in. each, the width would be taken as 18 in. Take the height from the floor to the top of the capping. Describe the nature of the work fully, and the thickness of the material, stating whether framed or otherwise.

Take the mouldings to capping and necking and to plinth separately, by the foot run, numbering the mitres. The plinth would be measured in with the pilaster. It would therefore only be necessary to add for the projection. The mouldings

to panels, where any, would be included in the description, and not be separately measured.

Columns are measured by the foot superficial, taking the height by the girth and stating the diameter. Give full description, stating whether glued up in narrow widths and closely blocked, or as the case may be; also whether the column is straight or diminishing. Measure the caps and bases separately, and state whether glued, upright and blocked for turning, or whether glued parallel, or in thicknesses, &c. Measure the grooves as to necking by the foot lineal, also any fluting in like manner, numbering the stops. Any carving to

FIG. 38.



caps would have to be taken separately, and the caps numbered according to size, stating the nature of the carving.

NOTE.—Some carvers take four times the diameter of the shaft of the column measured under the necking, for the circumference of the cap. This method is not satisfactory. It is better to give a sketch figuring the height and diameters.

Framed partitions are measured superficially, taking the length by the breadth, and stating the thickness. Give full description of the work, whether square, moulded one or both sides, &c., &c., and number any angle-irons for securing the same, &c. The doors in the same are measured in, and the dimensions of the door again taken separately, and described as "extra labour to doors in do." Run the fillet round door,

taking the dimensions round the outer edge, and describe it. Circular corners are measured by the foot run, and described as "extra."

Cupboard fronts are measured similarly to framed partitions, the doors in same being also described as "extra."

Spandrel framing to stairs, &c. (see Fig. 38), is measured net to obtain which the length is taken by the full height and halved, thus:

½	16·6		1¾-in. deal spandrel framing, panelled in small panels, average 1 foot superficial each, moulded one side, square the other.
	9·6	78·5	

The thickness and description must be stated, as shown in the example. Measure the doors in, as described to partitions, and afterwards charge the additional labour on the same as an "extra." Take all fastenings to doors at the time of measuring them.

Shop fronts.—Measure the stall-board by the foot lineal, stating scantlings and the nature of the labour on the same; also transoms and any other details, stating fully the method of finishing. The lining under stall-board, the show board, and lining under, are measured superficially, stating the thickness and quality of the material and workmanship. Note any trimmings for basement lights, and make the deductions and additions for the same where they occur. The shop-sash is measured by the foot run, taking the total length each way, and describe fully the nature of the work, and the thickness and quality of the work, how secured—whether guard-bead outside and shifting beads and brass screws and collars inside, or whatever way may be adopted. Also state the number of lights. The measurement of the door would be the same as already described for other doors.

Take the fascia by the foot super, and also any linings to brestsummer, story posts, &c.

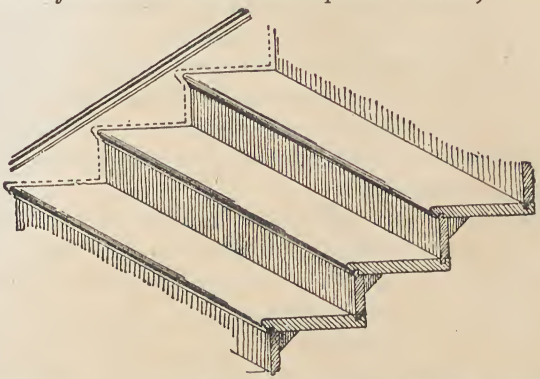
The measurement of bracketing for cornice has already been described in the Carpenter.

It is also customary to measure with the Joiner any com-

position mouldings, including the fixing in wood framing, taking it at per foot run, stating the width and nature of the mould, and whether straight or circular—all mitres being numbered.

Shop shutters are measured by the foot superficial, taking the net dimensions of the whole surface for rebated shutters, and stating the thickness and nature of the framing. Number all ironmongery as it occurs.

Patent and other steel or wood revolving shutters are also measured by the foot super, measuring to the top of the roller (which may be much above the exposed surface). In cases



where there is a wicket door formed in the shutter, it must be taken "extra only forming wicket door framed and ledged, made portable, and complete with iron stays, closing strip of iron, lock and furniture," all these latter being collected and taken into Smith and Ironmonger Bill respectively. It is necessary to specify the kind of lath, thickness of same, kind of webbing or tape, kind of hinge, spring and roller. The steel shutters being very weighty require special opening and closing gear which should be described. Some surveyors prefer to take shutters in a provisional item. Provide for attendance by other trades for cutting, &c. Take the casings and boxings per foot super, and provide for cupscrew fixing for access to roller.

Staircases.—In measuring staircases take firstly the length of the tread, including the housings into strings, for the one dimension, by the height of riser, plus the width of tread for the other, the extreme dimensions being taken in each case.

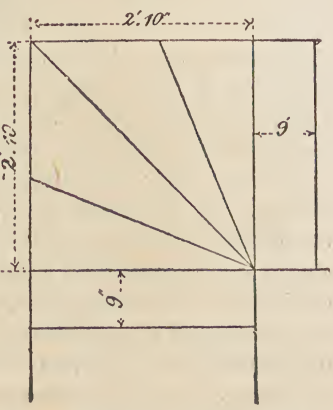
This will give the dimensions for one tread and riser, which will have to be multiplied by the number of such steps. Presuming we have ten fliers 3 feet long, as sketch (Fig. 39), they would appear in the Dimension-book thus:—

			Width of tread	12 in.
			Height of riser	$6\frac{1}{2}$ „
				$1 \cdot 6\frac{1}{2}$ „
10	3·0		$1\frac{1}{4}$ in. deal treads with moulded nosings, and	
	$1 \cdot 6\frac{1}{2}$		1 in. deal risers, upon and including strong fir	
	—	46·3	carriages; and glued, blocked, and bracketed.	

State the thickness of the tread and riser as shown in the example given, and also how the nosing to tread is to be finished, whether rounded or moulded; also if it is to be returned round the step. It is advisable to give the sizes and number of the carriages under stairs, where stated in the specification; but this is very seldom done, they being in great measure left to the option of the builders.

Where the steps are mitred to string it necessary to state so, and also whether the treads and risers are glued and blocked. If the risers are tongued at each edge, this should be included in the description; also specify if the winders are cross-tongued. Where the bottom step is finished differently from the others, as a curtailed or bull nosed step, it will have to be kept separate, and numbered according to the description. Where a nosing is run on the floor, as to the top step, it must be taken and described as "— feet run of deal moulded nosing on floor to form upper step." The riser in this case would be measured in with the stairs.

Fig. 40.



In measuring the winders it is customary to take the entire space occupied by them, whether quarter space or otherwise, adding to the width an additional inch for the projection of each nosing, and collecting the heights of the several risers.

Thus :—

Treads	2·10
Housings	2
2 nosings	2
	3·2

3·2 3·2	10·0	Do. in cross-tongued winders.

It will be necessary to add to this dimension that for the risers, so that both the treads and risers in winders may be abstracted together. In this case as the risers are of different lengths they must be collected on "Waste," and the whole brought forward in one item, thus :

3·0	
3·6	
4·3	
3·6	
14·3	

14·3 ·6½	7·2	Add risers collected.

These dimensions added would give the area of the treads and risers in the winders, which, as before stated, must be kept separate from those of the straight steps, which are technically called fliers.

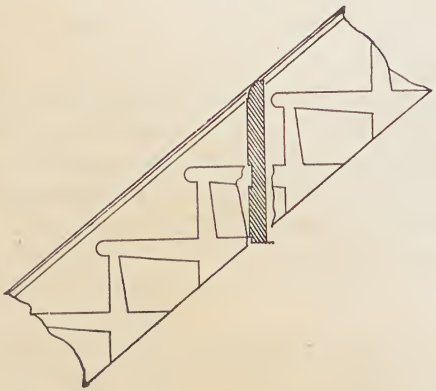
Number the housings to treads and risers, keeping those to winders separate from those to fliers. Brackets are also numbered and described according to the nature of their execution, keeping the circular brackets to winders separate from the straight to fliers. Also, number and describe the curtail end to bottom step as before stated, and also the dovetailed sinkings for balusters where they occur.

As some readers may not understand what is meant by a "housing," it is thought desirable to give a sketch in explanation (see Fig. 41).

Measure the **strings**, taking the extreme lengths, including

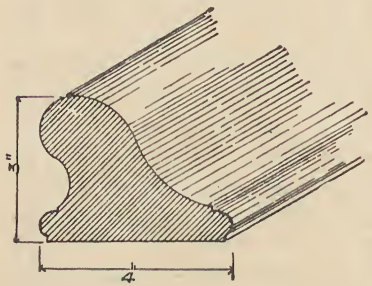
all housings, &c., by the width, the latter generally being *assumed* to be 12 in. State the thickness of the material, and give full description, stating whether plain wall string, rebated

Fig. 41.



and beaded outer string, sunk or moulded ditto, also if mitred to risers, &c. Specify if wreathed, how the wreath is formed, whether solid or in thicknesses, &c. All ramps are included in the one dimension for the length of string, but afterwards they are numbered as "*extra* to ramps in the moulded wall string," or as the case may be. Also number all the housings, angles and ends, stating whether splayed or returned, and the description of the string.

Fig. 42.

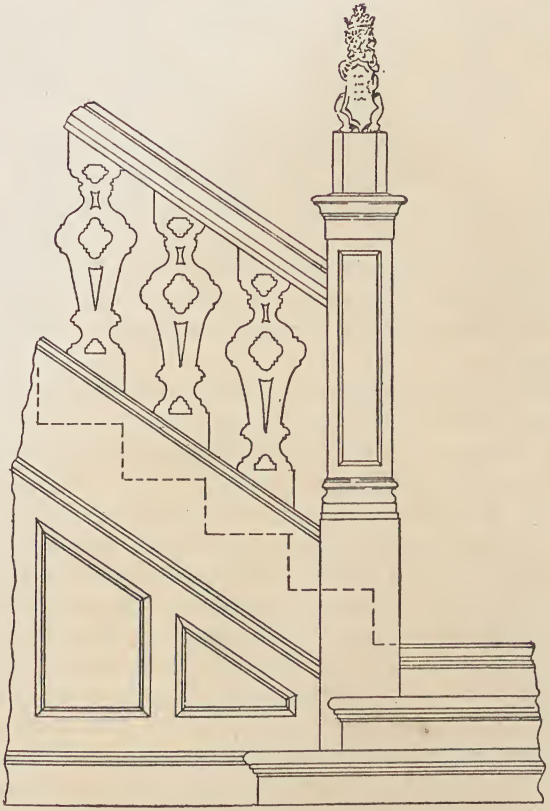


Measure **linings to well-holes** by the foot superficial, describing the thickness of the material and the quality of the labour upon the same.

Take the length of the **handrail** along the centre of the top

of the rail, keeping the portions that are ramped, wreathed, and scrolled, each separate from the straight. The level portions, where circular, must be also kept distinct. Describe the

Fig. 43.



nature of the handrail, whether moulded or otherwise, giving sketch if moulded; and also the material, whether solid or veneered, and if French polished; and give the size, being the largest dimension each way (see Fig. 42).

Take the labour to fitting and fixing the **iron core** at per foot

run, describing whether straight or circular; also the sinking for same in a similar manner. Take the mitred and turned caps on newels at per number; also number the screw-nut and joint to caps, handrail screws, and fixing, &c. Where the openings to well-holes are small, it is customary to give the width of them, as the diminished width increases the cost of preparing the circular portions of the handrail inclosing the same. The limit of width is generally understood to be about 16 in., all below this being so described.

Newels are generally numbered, stating the total length, including the tenon, and give the full scantling of same measured where the dimensions are the greatest. Fully describe the labour on the same, and the turnings, if any. Iron newels are measured in the same manner as the foregoing, and billed with the Smith, the labour in fixing being, however, billed with the Joiner, and also the labour and material in preparing mould for casting.

Balusters if planed square or round may be measured by the foot run, including the tenons, or they may be numbered. It will be necessary in describing them to state the size, if nailed at both or either end, or if dovetailed. When the balusters are turned to pattern, or pierced as Fig. 43, it is best to number them, stating the height and size, and giving a full description of the same, with the mode of fixing as before. Iron balusters can be measured by either of these ways, as they are afterwards reduced to weight as shown in the Smith. Ornamental iron balusters, however, must be taken at per number, and it is customary to fix a P.C. (prime cost) price to them. Where they are not intended to be selected from a pattern-book, but to be executed from special design in cast iron, take labour and material in preparation of mould for the same. In all cases where of iron, take labour for fixing at per number.

Closet fittings.—A P.C. sum is now generally given, and the item is numbered. This is because manufacturers sell modern closets on this system. The fixing of closet is also numbered (see page 110).

Kitchen dressers, plate-racks, &c., are generally numbered,

and the full description from specification quoted with the P. C. (prime cost) if stated.

Sinks.—These are also numbered, with size stated, and description.

Having concluded the description of the various articles in joiners' work *seriatim*, the Table of Admeasurement may be prefaced with a word or two. Firstly, as to the order in which the various descriptions of labour and material have been arranged. Of course, where such a multifarious list of articles appears, as in this trade, differences of arrangement are sure to exist. The course which has been adopted is to keep the different descriptions of labour as much as possible with the various articles to which they refer. Thus, commence with the floors, and abstract and bill all labours appertaining to the floors before commencing the skirtings. The same with the skirtings. Then take the sashes and frames, doors, linings, shutters, staircases, water-closets, &c., &c., keeping them all separate, as shown in the Table. Many surveyors do not follow this course, but prefer to arrange them all according to their thicknesses, without regard to what they refer to, commencing the list with those of the least thickness, and proceeding in this way to that of the greatest thickness. These different thicknesses are again arranged according to the quality of the work, that of the least value being placed first. With all due deference to those who follow this course, it is thought that the former method is better, and, therefore, its adoption is recommended.

This Table is not intended to include *every* description of labour in the trade. In a work like the present this would be unadvisable, and indeed impracticable. Sufficient examples, have, however, been given to enable the reader fully to understand the text of the book; the method of measurement, and the order of taking out, abstracting and billing them. They have also been made as diversified as possible, as will be seen on reference to it. The whole of the various items are presumed in the present case to be in deal, for the sake of making the Table as short as possible. Where the work is in oak, mahogany, or other hardwood it should be kept separate

from the deal, and brought into bill after the whole of the deal has been abstracted. Where both oak and mahogany appear it is customary to give the oak precedence. French polishing, where described in the specification, should also be included in the description in the Bill of the Joiners' work.

The ironmongery is kept separate from the woodwork, as shown in Table VIII.

TABLE VIII.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

Inch deal flooring, laid folding	At per square of 100 ft. super.
Ditto yellow batten flooring, laid straight joint...	,,
Ditto, ditto, with splayed headings	,,
Ditto, ditto, with ploughed and tongued headings	,,
Ditto, ditto, dowelled	,,
Extra to sinking in floor for mat, with straight joint all round	At per foot super.
Extra to mitred border to slab in inch flooring...	At per foot run.
Ditto, ditto, to door-mat ditto	,,
Close joint to old floor	,,
¾ in. × 7 in. deal square skirting, including backings	,,
¾ in. × 7 in. ditto torus ditto and ditto	,,
1¼ × 9 in. ditto moulded ditto and ditto	,,
1½ × 12 in. ditto, ditto, and sunk ditto and ditto	,,
Tongued or mitred angles—*extra to*	At per number.
Housings *ditto*...	,,
Ramps *ditto*...	,,
Splayed ends *ditto*	,,
Returned ditto *ditto*...	,,
Inch deal narrow ground plugged to walls... ...	At per foot run.
Inch deal wrought and tongued dado	At per foot super.
1½ in. deal pilasters, mitred together, glued and blocked	,,
1½ in. diminished columns glued up in narrow widths and closely blocked, 12 in. diameter ...	,,
1½ in. deal moulded fixed sashes...	,,
Ditto, hung on centres	,,
Deal cased frames, oak sunk and weathered cills, and 2 in. deal moulded sashes, double hung with brass axle pulleys, patent lines, and iron weights...	,,
Extra only to semicircular heads to sashes and frames as before, measured square...	,,
Deal cased frames, oak sunk and weathered cills, and 2¼ in. deal moulded sashes, circular on	

TABLE VIII.—*continued.*

plan, double hung, with brass axle pulleys, patent lines, and iron weights...	At per foot super.
Extra only to circular heads and sashes and frames, as last, measured square	,,
Deal cased frames, oak sunk and weathered cills, and 2 in. deal ovolo sashes to Venetian windows, double hung with brass axle pulleys, patent sash lines, and iron weights, the side lights to be fixed lights...	,,
1½ in. deal bead butt and square lifting shutters	,,
Ditto bead flush and square back flaps	,,
Ditto deal moulded shutters, bead butt at back, hung in three heights	,,
Ditto proper boxing grounds on splay...	,,
Deal wrought and moulded stop screwed to door	At per foot run.
Fir in proper door frames	At per foot cube.
Ditto in casement frames	,,
Follow with various moulded	,,
Ditto with ditto circular on plan...	At per foot run.
Oak in wrought sunk and weathered window cill	At per foot cube.
Ditto ditto, door cill	,,
Shop sashes, with full description	At per foot run.
Inch deal proper ledged door	At per foot super.
1½ in. ditto framed, ledged, and braced doors, filled in with inch matched and beaded battens	,,
2 in. ditto framed and braced door, filled-in with V-jointed battens, grooved and tongued, to have quadrant and square corners	,,
Ditto ditto, four-panel and square door	,,
Ditto ditto, panels moulded one side	,,
Ditto ditto, moulded both sides	,,
Ditto ditto, two-panel bead butt and square door	,,
Ditto ditto, three-panel bead flush both sides doors, with diminished upper stiles, upper panel open for glass	,,
2 in. deal three-panel bolection moulded and bead flush door, the upper panel open for glass, with loose moulding fixed with brass screws and cups	,,
Ditto ditto, ovolo sash door, the two lower panels to be moulded both sides	,,
Ditto ditto, rebated folding doors, in four panels each fold, panels moulded both sides	,,
2¼ in. ditto framed and braced doors, filled in with 1 in. battens, matched and V-jointed, and the framing stop-chamfered	,,
Ditto ditto, folding doors hung with swing hinges, lower panels bolection moulded and raised on one side, and flat moulded and raised the other, upper panels open for glass, with large	

TABLE VIII.—*continued.*

bolection moulding one side and brass screws to beads on the other side	At per foot super.
Inch deal wrought and framed grounds	,,
Ditto ditto, to segmental heads	,,
Gates, various forms of...	,,
Moulded capping giving size	At per foot run.
Gate posts (state if butts charred, or treated in any other manner)	,,
Cut ends, as sketch	At per number.
Forming wicket gate (*extra only*)	,,
Inch deal wrought one side and beaded linings, including backings	At per foot super.
Ditto ditto, tongued to frames and ditto	,,
Ditto ditto, splayed linings and ditto ditto ...	,,
Ditto ditto, and double beaded and cross-tongued linings and backings to opening	,,
Ditto ditto, tongued and staff-beaded lining to segmental heads...	,,
Ditto ditto, rebated and rounded window boards and bearers	,,
Ditto ditto, two-panel moulded window backs and backings	,,
Ditto ditto, moulded elbows and ditto	,,
Ditto ditto, on splay	,,
Ditto moulded soffit with splayed ends	,,
Take all window boards, linings, &c., under 6 in. wide	At per foot run.
Flap to shutters, stating size and labour on same	,,
Labour to groove	,,
Ditto to cross groove	,,
Ditto to groove in oak	,,
Ditto to splayed cutting to inch linings	,,
Architraves, various girths, stating sizes, &c. ...	,,
Plinths with all details (extra to architraves) ...	At per number.
Notched, returned, and rounded ends to window boards	,,

DEAL IN THICKNESS.

$\frac{3}{4}$ in. one side matched and beaded batten boarding, plugged to walls	At per foot super.
Ditto ditto, boarding in $4\frac{1}{2}$ in. widths to ditto ...	,,
Ditto ditto, fixed on and including 1 in. battens to ditto...	,,
$\frac{5}{8}$ in. one side and staff-beaded casings	,,
Ditto, both sides matched, beaded, and ledged batten boarding	,,
Inch one side and V-jointed boarding, fixed diagonally...	,,
1 in. one side cross tongued shelves and bearers	,,
$1\frac{1}{4}$ in. both sides framed and beaded cupboard front	,,

TABLE VIII.—*continued.*

Extra only labour to door in ditto	At per foot super.
1½ in. both sides and cross-tongued batten boarding to spandrel	,,
1½ in. deal wrought, both sides ploughed, tongued, and dovetailed cistern	,,
Ditto, proper ledged folding flaps to ditto	,,
2 in. deal framing, panels moulded on both sides, properly secured to floor and ceiling	,,
Extra to circular corner in ditto	At per foot run.
Labour to rounded edge	,,
Ditto bead	,,
Ditto rebate	,,
Ditto rebated and mitred angle to lining	,,
Wrought fillet...	,,
Deal beaded capping	,,
Various thickness of electric wire and pipe casings, with all descriptions	,,
Deal moulding 3 in. girth	,,
Ditto, architrave ditto, 4 in....	,,
Ditto, ditto, 5 in.	,,
Ditto (circular) ditto 5 in.	,,
Mitres to 5 in. moulding	At per number.
Other mitres follow in order	,,
Copper lids, with description	,,
Deal moulded cornice, 6 in. girth	At per foot run.
Mitres, &c.	At per number.

STAIRCASES.

¾ in. deal wrought risers	At per foot super.
Ditto ditto, and beaded fascia	,,
Inch ditto ditto, wrought treads and risers, glued, blocked, and bracketed, with rounded nosings upon and including strong fir carriages... ...	,,
1¼ in. ditto ditto, with moulded nosings and ditto	,,
Ditto ditto, in winders	,,
Other materials to follow here	,,
1⅓ in. plain wall string	,,
1½ in. ditto moulded ditto	,,
Ditto ditto, cut and mitred outer string	,,
2 in. deal moulded nosing	At per foot run.
3 in. deal wrought and square framed newel ...	,,
3½ × 3 in. deal moulded handrail	,,
1 in. deal square bar balusters	,,
Housing treads and risers to close string	At per number.
Ditto ditto, winders ditto	,,
Ditto, treads and risers to cut and mitred outer string	,,
Ditto ditto, winders ditto	,,
Ditto, treads and risers to newel	,,

TABLE VIII.—*continued.*

Ditto, strings to ditto	At per number.
Ditto, handrail to ditto	,,
Ditto, for balusters to handrail and treads ...	,,
Tongued and mitred angle to wall string	,,
Extra to ramp in moulded wall string	,,
Ditto, ditto, in cut and mitred outer string ...	,,
Cut and mitred brackets to steps...	,,
Returned and mitred moulded nosings to fliers...	,,
Ditto ditto, winders	,,
Extra to rounded end to step and riser	,,
Extra to curtail end to step...	,,
Ditto splayed ends to deal handrail	,,
Ditto end of handrail cut and pinned...	,,
Ditto mitred cap ditto	,,
Extra only to turnings to newel	,,
,, cut pendants	,,
Cut and chamfered caps	,,
Ornamental newels (with description)	,,
Ditto balusters (ditto)	,,
Extra to ramp in handrail	,,
Ditto wreath ditto	,,
Ditto scroll end ditto	,,
Screw nut and joint	,,
Pedestal and valve closets	,,

KITCHEN AND SCULLERY.

Deal dresser (with full description)	At per number.
Ditto plate-rack ditto	,,

IRONMONGERY.

Including screws and fixing.

Pairs butts (according to size, stating the smallest sizes first, and keeping the cast and wrought iron separate, also the brass)	At per number.
Pairs rising butts (ditto)	,,
Ditto back flaps (ditto)	,,
H or HL hinges, ditto	,,
Cross garnet hinges	,,
Patent swing hinges for 2 in. doors, and letting in floor...	,,
Pairs steel centres on plates...	,,
Necked bolts (stating size)	,,
Barrel ditto, with brass throw (ditto)	,,
Brass flush ditto (ditto)...	,,
Gothic cast-iron door knob	,,
Ditto knocker...	,,
Iron barrel door-chain	,,
Norfolk latches	,,
Brass cased pulpit latches	,,

TABLE VIII.—*continued.*

Mortise latches	At per number.
Cupboard locks	,,
Dead locks (stating size)	,,
Iron rim-locks and brass furniture (stating size)	,,
Mortise locks and ditto	,,
Rebated ditto ditto...	,,
Two-bolt mortise lock and ditto ditto...	,,
—— patent lock, P. C.	,,
W. C. signal latches, P. C.	,,
Sets white china furniture	,,
Ditto black and gold ditto ditto	,,
Pairs, large porcelain finger plates	,,
Pairs, small ditto ditto	,,
Brass spring sash fastenings	,,
—— patent ditto ditto	,,
Sets of brass sash centres	,,
Brass knob turn-buckles	,,
Ditto thumbscrews...	,,
Iron stubs and plates	,,
Ditto shutter lifts	,,
Brass ditto latches...	,,
Brass quadrant regulator fastenings, with pulleys, lines and hooks, complete to fanlights	,,
Leather straps and brass buckles and plates to spring doors...	,,
Galvanised iron water bar	At per foot run.
Wrought-iron balusters...	At per number.
Ditto newel (twisted or otherwise)	,,

The following is quoted from the *Standard Method of Measurement of Building Works*: "Unless work is described as finished sizes one sixteenth of an inch shall be allowed for each wrot. face."

CHAPTER VIII

SMITH AND FOUNDER, GAS-FITTER, BELLHANGER, AND ELECTRICIAN

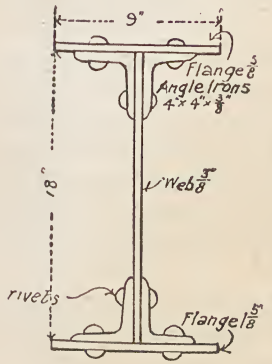
IT is customary in measuring the smith and founder's work to commence with the articles executed in steel and wrought iron, which, owing to the difference in price and workmanship, must be kept separate from those executed in cast iron. Many of the items are taken off with the other trades to which they have reference so as to prevent them being omitted; and with respect to these, it will be necessary to bring them into the abstract, in order that the whole of the trade may be billed from the one abstract.

Ironwork generally is billed by weight. The exceptions to this rule will be found in the Table. Ironwork is measured from the drawings in feet and inches, and abstracted according to its thickness, the transfer to weight being carried out on the abstract. The means of affecting this are various. One example will be given hereafter, but the measurement will be first dealt with.

Wrought Iron.—Wrought iron in chimney and bearing bars is measured by the foot run, taking the extreme length, including turnings up and down, and billed at per cwt. These are taken off with the bricklayer and are also sometimes numbered. **Flitches** (see fig. 23, p. 65), which are measured with the carpenter's work, are also measured by the foot superficial. Make no deductions for the holes for bolts, because, if drilled, there would be no deduction, and if punched, the

deduction would only be worth the weight of old iron. Number the holes in flitch for the bolts, stating the thickness of the metal. An example is given, showing the method of measuring a riveted girder 20 ft. long as shown in Fig. 44.

Fig. 44.



			Angle-iron.
20·0			
1·6	$\frac{3}{8}$ in. web. .		
20·0			
·9	$\frac{5}{8}$ in. bottom flange.		
20·0			
·9	$\frac{5}{8}$ in. top do.		
4·20·0			4″
8	$\frac{3}{8}$ in. angle-irons.		4″
			8″
		3/2/20/3	$2\frac{1}{2}$ in. by $\frac{3}{4}$ in. rivets.

If preferred, the top and bottom flange may be taken in one item, thus :—

20·0	
·9	$1\frac{1}{4}$ in. top and bottom flanges.

adding the thickness of metal together. The rivets, as will be observed, are taken as 4 in. from centre to centre. The more usual way of dealing with the rivets is to take the weight of plates, angles, &c. and add 5 per cent. for rivets. The holes need *not* be numbered in this description of girder, as they are included in the item. The weight of the above girder is 17 cwt. 2 qrs., and readers can easily work it out for themselves. The weight of iron per foot is given on page 115. It will be observed that the extreme dimensions of the angle-irons have been taken each way for the width, but it is now usual to arrive at the weight of these by multiplying the length of angle by the weight per foot of the section as given in the British

Standard list. Tees, channel rolled joists, &c. are also measured at per foot run and the weight calculated by reference to the British Standard. They are billed by weight.

The small rolled joists, under 9 inches high, should be kept separate, as should the different larger sizes. State if to stock lengths and how many joists are included in the given weight, and how far they are to be hoisted. Keep joists over 30 feet separate and give the lengths.

In measuring **circular** columns where solid, it will only be necessary to take the length by the average diameter, making an addition for the cap, base, and caulking. Hollow columns are taken by the foot superficial—the length by the average mean circumference—adding for cap, base, and caulking as before. In the case of solid columns the dimensions would be reduced to the foot cube, and the weight would be easily found.

Long Bolts are measured by the foot run, stating the diameter, the head, nut and washer being taken separately, and the whole sometimes reduced to weight, as shown in the Table. Where the bolts, however, are under 1 foot in length, it is customary to number them according to their respective lengths and diameters, and include heads, nuts, and washers if required. Straps are taken at per foot superficial, as are also railings, grating bars, and other work of a similar description, and afterwards reduced to weight.

Wrought Iron and Steel Sashes.—These are sometimes measured at per foot super, giving full particulars of section, keeping separate the small from the large, also keeping apart all ventilators, circular heads, and other special forms or labours, and numbering all fastenings, and put same at per number in Ironmonger. Sashes may also be taken at per number, stating size and full description. The fixing of sashes is taken at per number, and is billed in the Bricklayer giving particulars.

Cast Iron is measured in the same manner as wrought iron and steel, and remarks thereon will therefore apply to this. State at the head of the bill for the cast iron that the cost for patterns

for casting from is to be included in the several items, or take and enumerate the patterns separately, in which case they are billed sometimes with the Carpenter and sometimes with the Founder's item to which they relate. This course is, however, seldom taken, the items including both patterns and fixing. The Table shows the method of measurement, and it is therefore unnecessary to be repeated here. A little difficulty may present itself at first in calculating for the weight or ornamental work, but by experience this is soon overcome. It is customary to measure it pretty fully, to allow for slight variation in the full size detail.

In measuring the various items, such as **gutters, rain-water pipes, cresting, gates, coal-plates,** &c., &c., it will be necessary to give the sizes and description, not forgetting to number all outlets, &c., to guttering and heads to rain-water pipes.

Corrugated Iron Roofing.—This form of covering is measured at per square fixed complete, including all cone-headed rivets and washers.

For the area of **roofs,** measure the surface and add one-sixth for laps; if corrugated a fourth. Where roofs are curved, add as extra for curved roof radius—feet in girth.

Ridges are measured at per foot run, stating the form and how secured.

Cast Iron Sashes are measured in the same manner as wrought.

Wrought iron weighs 40 lbs. to the foot superficial of 1 in. in thickness, and cast iron $37\frac{1}{2}$ lbs. From these two items the student will be able to arrive at all his calculations.

Herewith are given two examples of taking-off and abstracting:—

EXAMPLE OF TAKING-OFF A STANCHION. FIGS. 47–50.

			Base 1·2 width 1·8 length average
	1·8		
	1·2	2·0	$1\frac{1}{4}$″ metal in base
			Arms 10″ × 2 = 1′ 8″
	1·8		
	10·7	17·3	1″ metal in stanchion in centre
			FIG. 45.
4/$\frac{1}{2}$	10·7		
	1	$10\frac{1}{2}$	Ddt. do. do. centre
	10·7	16·0$\frac{1}{2}$	
	1	1·0	1″ do. in angles of centre
			FIG. 46.
4/$\frac{1}{2}$	·5		
	·2	·2	1″ do. in feet of cross-bars
4/$\frac{1}{2}$	·3		
	·1$\frac{1}{2}$	·1	1″ do. in head do.
4/4	·5		
	·3$\frac{1}{2}$	2·0	1″ do. in stiffeners
			Collections angle to stiffeners.
			Stiffeners length 4/8/8″ = 21·4
			Bottom ,, 4/12″ = 4·0
			Top ,, 4/11″ = 3·8
			29·0
$\frac{1}{2}$/	29·0		
	1	1·3	1″ do. in angles to stiffeners (as collection)
		22·0$\frac{1}{2}$	
	1·1		
	1·1	1·2	$1\frac{1}{4}$″ metal in head (bottom part)
	1·9		
	1·1	1·11	$1\frac{1}{4}$″ do. add for top
		3·1	
	1·1		
2/	1·1	2·4	1″ metal in sides
	1·1		
	11	1·0	1″ do. in division of head
		3·4	
	1·9		
	1·1	1·11	Planed head
	1·8		
	1·2	1·11	Add do. base
		3·10	

STANCHION AND COLUMN.

FIG. 47. FIG. 48. FIG. 51. FIG. 52.

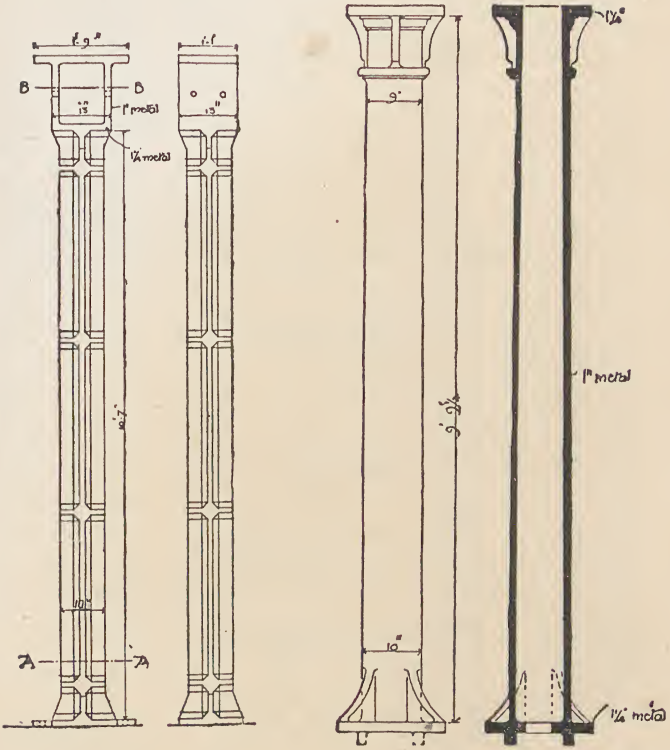


FIG. 49. FIG. 50. FIG. 53.

Plan A A. Plan B B.

BASE HEAD BASE

4	4	Extra to labour in riming out hole in 1″ metal
2	2	do. do. do. 1¼ do.
		Here take bolts and nuts.

EXAMPLE OF TAKING-OFF IRON COLUMN. FIGS. 51–53.

Diameter to centre of metal.
base = 9″
top = 8″
2)17
8½ av. d am.
∴ circumference = 2 2¾

9·10		
2·3	21·10	1″ metal in shaft
2·9		
2	·3	1½″ do. in neck mould (10½″ diameter)
2·9		
2½	·7	1½″ do. add
	1·1	
1·5	1·7	1¼″ do. in head
1·6		
	1·9	1¼″ do. in base add
	3·4	
4/½	·1	1¼″ do. deduct in base
7″	·3	1¼″ do. do.
	·4	
4/½	·8½ ·3½	1¼″ do. in brackets to head
	·5	
4/	·9 ·8	1″ do. in stiffeners to base
	1·0	
2/	·3 ·2½	1½″ do. in lugs to base
	·2	
		Labour to riming ¾ holes for bolts
2/	2	
	·4	Here take bolts and nuts

Abstract of Stanchion.

Cast Iron.

Cast Iron in Stanchion.

$1\frac{1}{4}$ in. metal.

2·0
3·1

Reduce 3·1
to 1 in. 1·5

6·4

1 in. metal.

$22{\cdot}0\frac{1}{2}$
3·4

$25{\cdot}4\frac{1}{2}$
6·4

31·9
37·6 lbs. per ft.

1190·$7\frac{1}{2}$ c. q. lbs.
= 10 2 14

Planed heads and bases.

3·10

Extra to labour in riming out hole in 1 in. metal.

4

do. do. $1\frac{1}{4}$ in. do.

2

Abstract of Iron Column.

Cast Iron in Column.

$1\frac{1}{2}$ in. metal.

1·1
·2

Reduce 1·3
to 1 in. ·7

1·10

$1\frac{1}{4}$ in. metal.

3·4
·5

3·9
Ddt. ·4

Reduce 3·5
to 1 in. ·10

4·3

1 in. metal.

21·10
1·0

22·10
4·3
1·10

28·11
37·6 lbs. per ft.

1084·4 c. q. lbs.
= 9 2 20

Labour to riming $\frac{3}{4}$ in. holes for bolts.

4

It may be observed that it is a common practice amongst some of the profession, in treating of small buildings, to make a "provision" for many of the items, instead of measuring them, that is, to provide for a certain weight, and whatever is used under or over this amount must form a deduction or addition to the estimate, as the case may be; and after considerable experience it is possible to fix the weight in such cases pretty closely, although it is a course which cannot be recommended.

Some surveyors take the length of girders, &c., and multiply by the weight per foot run that is ascertained by reference to the tables issued by the various iron founders.

TABLE IX.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

WROUGHT IRON AND STEEL (*including Hoisting and Fixing*).

In rivetted girders	At per cwt.
„ rolled steel ditto	„
„ roof trusses	„
„ chimney and bearing bars...	„
„ furnace ditto	„
„ straps and ties	„
„ bolts and ties, with screwed ends, with nuts and washers	„
„ half-round handrails and square or round balusters	„
„ plain window-guards	„
„ framed area gratings	„
„ „ hand-rail,—in. × —in.	„
„ „ balusters, —in. × —in.	„
Corrugated iron roofing (giving full description of gauge, if curved, &c.)	„ At per square super
Iron ridge (stating forms and how fixed, &c.) ...	At per foot run.
Wrought iron sashes (giving full descriptions and sizes of each	At per number.
Wrought iron sashes, extra only to forming ventilator, &c., stating size and form	„
In nuts and bolts under 12 in. long, and other small items	„
Ends of joists cut and fitted —in. × —in. into R. I. J. —in × —in. and including 4 in. × 4 in. angle plate 6 in. long and all bolts and drilling	„
Extra only to labour in ramp to handrail —in. × —in., then follow wreaths, &c.	„

TABLE IX.—*continued.*

Extra only to labour in straps to king and queen heads and special straps	At per number.
Rivetted tanks, with full description of thickness, &c.	At per gallon.
Coppers	„

CAST IRON (*including Patterns and Fixing*).

In plain girders	At per weight.
„ open ditto	„
„ solid columns	„
„ hollow ditto	„
„ heads and shoes to principals	„
Frames for pavement lights, giving full description, with particulars as to size	At per foot super.
Extra only on ditto ditto, but circular (measured square)	„
Eaves gutter	At per foot run.
Extra only to stopped ends	At per number.
„ „ angles	„
„ „ returned and mitred angles	„
„ „ outlets	„
Wire domes to outlets, giving size	„
Rain-water pipes	At per foot run.
Heads	At per number.
Extra only to swan necks	„
„ „ plinth bends	„
„ „ shoes	„
Ears	„
Iron cresting	At per foot run.
Finials	At per number.
Shutter bars	„
Air bricks	„
Gratings	„
Coal plate, giving diameter and description	„
Brackets	„
Balusters, with P. C. or description	„
Stoves (according to description, giving P. C.) ...	„
Ranges (ditto)	„
Copper doors and frames	„
Labour to riming holes for bolts, giving thickness and diameter	„
Cast iron shoes to roof trusses weight — lbs. including mould	„

GASFITTER.

Gasfitters' work is measured as shown in the accompanying Table. It will be necessary for the surveyor to specify the lengths, sizes and quality of the pipe as shown therein, and to

number the various fittings to the same, as elbows, &c., as *extra to*, beyond the price of the tubing, the lengths of the same being included in that of the pipe. Short pieces of pipe, that is, when under 2 feet in length, are numbered in the same way, also as extra. Of course it will be unnecessary to give the different descriptions of the several articles used in gasfitting, the object being simply to show how they are measured. The descriptions and prime cost values of special items, such as gas fittings, &c., should be inserted in the Bills of Quantities.

Make an item for paying the fees to the gas company for opening the ground and tapping the main ; and any excavation beyond this, where intended to be executed by the builder, should be measured by the foot run, and the depth stated. An item is also made for cutting away for, attending upon, and making good after this trade, where meter is to be supplied by builder.

TABLE X.

This Table has a double use ; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

Welded gas-tubing (according to size, stating the diameter of the bore of the pipe)	At per foot run.
Bends, elbows, tees, crosses, sockets, outlets, extra to outlets, stating diameter of bore in each case	At per number.
NOTE.—Each of these items should be specified separately in the "Bill."	
Stop-cocks and brass spanners, stating size and description, with patent bye-pass for Incandescent and other burners	At per number.
Gas meters, stating number of lights it is to supply, and description	,,
Gas pillars, brackets, pendants, &c., according to description	,,
Star burners and sun burners, according to description	,,
Pay gas company's fee for opening ground and tapping main	,,
Allow for cutting away for, attending upon, and making good after, all trades. ...	,,

BELLHANGER.

The description of the bellhanging is generally taken directly from the specification, stating the number and description of

the bells, and the various parts of the house from whence they are rung, and their positions; also stating whether the wire is intended to be concealed in secret tubes; if so, whether zinc or copper; and the description and quality of the pulls. This item would include all cranks, wire, &c.; but a separate item must be taken for the attendance of the other trades in cutting away, &c., and making good. Such is the customary mode of dealing with the bellhanger, the cost of wire being so slight that a few feet more or less make no perceptible difference in the estimate, and surveyors, as a rule, do not think it necessary to measure it. A general description of the bells should preface the bill, as shown in the accompanying Table; but, of course electric bells are now generally used (see page 124).

TABLE XI.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

The whole of the bells are to be hung in concealed zinc tubes with best cranks and wire, in the best manner, and all to have pendulums and brass labels.

Crank pulls on third floor, to ring to bell on ground floor	At per number.
Lever pulls with white and gold china furniture on first floor, to ring to bell on ground floor ...	,,
Call bells and brass slides on ground floor, to ring on third floor	,,
Bronzed sunk and dished pulls, 6 in. diameter, and fixing at entrance, engraved "Visitors," to ring one bell on ground floor	,,
Bronze draw-out pull, and fixing at entrance ...	,,
Allow for cutting away, for attending upon, and making good after, all trades.	

Where the surveyor prefers to take the several items separately, the following is the method of measurement:—

Copper wire	At per yard run.
Tubing (zinc or copper)	At per foot run.
Cranks (with description)	At per number.
Pulls ,, ...	,,
Bells ,, ...	,,
Attendance, &c., as before	,,

Electrician.

Electric bells are usually the subject of a P. C. provision, and when so provided for, only require the addition of a clause for attendance, &c., as mentioned for ordinary bells.

Where electric bells are not so specified, state the number of points, and number the pushes, bells and fittings, giving full details as to size and form of pushes and fittings for each bell, also form of bell, if continuous or single stroke; number the indicators and fixing of same, also number the shelves for holding batteries, and fixing of same (take the shelves and brackets in Joiner); state in preamble what size and description of battery is to be used. Number the attendance as above. The table hereunder is given as for other trades. In billing it will follow the Gasfitter as a subsidiary part of that bill, and will be carried to summary under the heading of Gasfitter and Bellhanger.

Table XII.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

Preamble (full).	
Ground floor pushes with platinum contact, in rosewood, 2½ in. diameter, to ring in basement (or push P.C.)	At per number.
Follow with other forms of fittings, as "pear push," &c., and then bells from other floors	„
Indicator box (—numbers) of polished mahogany or hardwood, with gilt lettered glass screen fitted with relay and having pendulum movement	„
Brass contacts and fitting complete in doors and windows	„
Continuous action bell with lever complete ...	„
Allow for cutting away and attending upon and making good after all trades.	

Electric Lighting (*Incandescent*).—In all cases where electric lighting is specified. it is best to obtain a price per

light from some firm, inclusive of wiring and casing, and to add thereto a P. C. price for the several fittings; these are an important element of cost, the prices varying from a few shillings to many pounds, and are to be had in many forms and materials, from a simple hanging shade with flexible cord, to the most elaborate electrolier.

Meters are supplied by the company, and a charge made per quarter for their use. Where cables are not laid on from the main, a provision must be made for opening and reinstating road, &c., for connection to main. Provision must be made for attending upon and making good in the several trades.

The various forms of arc lighting do not come under our notice, being principally used for outdoor lighting.

The following is quoted from the *Standard Method of Measurement of Building Works* :—"Rolled steel joints, except in compound girders and stancheons, shall be measured to whole feet in length, parts of feet being measured as whole feet. Cuts shall be enumerated in cases where joints are in dead lengths between steel construction, and also where necessary in cases where rolled steel joints are fitted to steelwork at one end and the other end is built into wall."

CHAPTER IX

PLASTERER

IN the admeasurement of plasterer's work it is advisable to adopt the course already prescribed, namely, to take floor by floor, completing one floor before the other is commenced. In this case, however, the rule is applicable only to inside work; that to outside being taken on the entire surface. Read carefully the specification, and keep the different descriptions of material separate. Commence then with the *external work*.

External Work.

Measure the entire portion plastered, taking the length by the height, including all projections for set-offs, plinths, strings, &c., and also the returns, so as to arrive at the entire area. Make all the deductions as they occur for openings, &c. Describe the nature of the workmanship and quality of the material. State whether laid on brick or on laths, and whether jointed to imitate stone.

Rustic grooves, V-shaped, square sunk, &c., to be taken at per foot run, and a sketch is sometimes given. Vermiculated work at per foot superficial as extra over ordinary work.

It is recommended that all additions be taken before any deductions appear in the Dimension-book or paper, as by adding or subtracting these items the total area

can be brought into abstract in one item, thus effecting a saving of time, and producing less complication. The total is afterwards reduced to the yard superficial and billed accordingly, as shown hereafter in the Table. Having disposed of the superficial area, take a running dimension of the arrises or angles, additional labour being necessary to obtain a clean sharp angle, and abstract and bill it accordingly. Labour to beads and quirks is also measured by the foot run. Take all reveals and soffits, and other work, where executed in narrow widths, by the foot run, stating width and including arris.

Cornices, architraves, &c., are measured by the foot superficial, taking the length by the girth; number all mitres, stopped ends and returns, stating in each case the girth of the mouldings to which they relate; all cornices under 6 in. girth are measured by the foot run. Take the enrichments by the foot run, stating the girth, and giving sketch in explanation, also numbering the mitres and stops to the same. All mouldings, architraves, &c., above 6 in. girth are measured by the foot superficial, taking the extreme length by the girth, as shown in Fig. 54, page 131; where under that girth, by the foot run; number all mitres, stops, and returns, stating in each case the girth as before. Take all beads and quirks by the foot run, and number the mitres and stops.

Columns, Pilasters, &c.—Plain work, &c., to columns, is measured by the foot superficial, and described as circular work to columns, the mouldings to necking and base being measured as already stated, but described as circular. Number the caps, and give a sketch showing what is intended, and also figure on it the height of the cap, and the upper and lower diameters. Pilasters are measured by the foot superficial. Take a running dimension of the arris, and also of the neck and base mouldings when under 6 in. girth; number the mitres. Number the cap, and give sketch and figure dimensions. Take any fluting to pilasters and columns by the foot run, stating whether diminished, and number the semicircular stoppings to same. Number the brackets.

Strings, &c.—Floriated moulded strings and parapets, &c.

&c., are measured by the foot run, giving sketches and dimensions for the different descriptions of work.

Balusters are numbered, giving sketch and dimensions.

Chimney-pots are numbered, stating dimensions, and, when out of the ordinary, giving sketch.

Rendering to inside of parapets, &c., is measured by the yard superficial, as shown in the Table.

Internal Work.

In measuring internal work, adopt the same course throughout each room; commence at the bottom of the house, and take floor by floor as already stated. Proceed to measure the ceilings firstly, then take the cornices, and then the walls and partitions; and lastly, whatever else remains, as skirtings, &c. Measure the ceilings the full dimensions between the walls; but where cornices occur, it is customary to make a deduction of the width of the cornice upon each dimension for width and length of ceiling. This is done on "Waste." Presuming the room to be 20 ft. long and 16 ft. wide between the walls, and a cornice run round the room, projecting from the face of the wall 12 in., this would appear in the Dimension-book as follows:—

Length	20·0
Less cornice	1·0
Net length	19·0
Width	16·0
Less cornice	1·0
Net width	15·0

19·0 15·0		285·0	Lath, plaster, float, and set ceiling.

Make the deductions for chimney breasts, &c., and also any additions that may occur. Refer to specification for description of the work, and state the same fully in the quantities, whether lath and plaster one coat; ditto one coat and set; lath, plaster, float, and set; or as the case may be. Some surveyors

take the sizing and whitening to ceiling, and include it in the one dimension, thus :—

19·0 15·0	285·0	Lath, plaster, float, set, and twice whiten ceiling.

This, of course, is quite optional ; but undoubtedly it effects a little saving of time, though the dimension for whitening ceilings would simply be a repetition of that for plastering.

Where elaborate ceilings occur, it is customary to measure such elaborations as "extra" to the ordinary work, and to take the same by the foot superficial, as, for example, to raise panels.

Panels.—Take mouldings to panels by the foot run, stating the girth ; number the labour to mitres, stoppings, &c. Also number pateras and ornaments ; and in the latter cases it is recommended that architects should always affix a P. C. value in the specification, as it is sometimes impossible to give sketch ; and in very few cases are details sufficiently far advanced to include the ornamental portions.

Cornices are measured the length by the girth, and where the latter exceeds 6 in. they are taken superficially ; under that girth they are, however, measured and billed at per foot run. To obtain the average length of cornice take the full dimension between walls for the lengths of two sides, and the net length between the nose of the cornices for the other. These should be collected on "Waste," thus taking the case already given * (cornice 1 ft. projection, 18 in. girth), we have :—

Length of room between walls ...	20·0
Ditto	20·0
Net length between cornice	14·0
Ditto	14·0
	68·0

68·0 1·6	102·0	Plaster moulded cornice to detail.

* On the previous page.

Or the length may be arrived at by taking the round of the walls and deducting the projection of the cornice, thus :—

	20·0
	20·0
	10·0
	10·0
Round of walls	72·0
2/2 projection of cornice ...	4·0
	68·0

Make the additions and deductions as they occur. Number all the mitres, and state the girth, and keep the external and internal angles separate. Also number the stopped or returned ends, stating girth as before. Enrichments to cornices are measured by the foot run, stating girth, and also whether undercut. The mitred angles and stopped ends to enrichments are to be taken and numbered as described to cornice.

Where the cornice is made up of many short lengths under 18 in. in length, keep the cornice separate and describe it as being in short lengths. Keep separate all bracketed cornices and describe them as being on lath, giving description of laths.

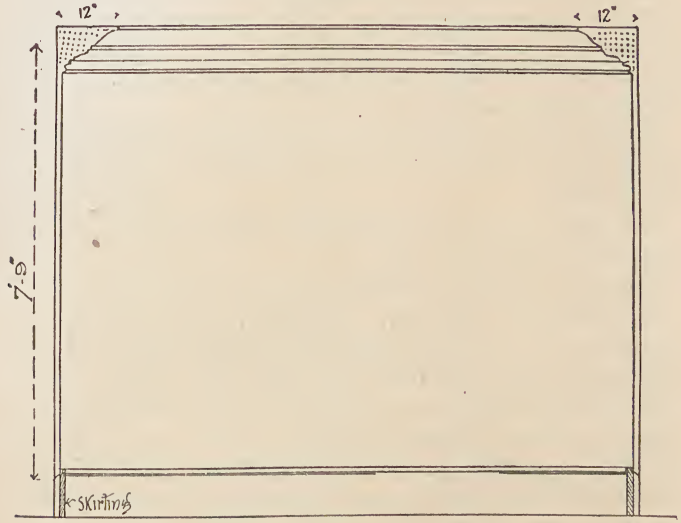
Keep separate all soffits of stairs and describe as such ; also keep separate and specially describe the soffits under the windows.

Friezes are measured the length by the width, and valued by the foot superficial, any enrichments being taken, as already described for cornices.

Rendering to walls is measured the length by the height, the latter being taken from the top of the skirting grounds to the ceiling, and where there is a cornice it is customary to deduct from this dimension half the height of the cornice. (See Fig. 54.) The lengths of the several walls of each department can be collected on "Waste," and brought forward in one dimension if preferred. Make the additions and deductions where they occur. In the case of deductions for doors and windows, take the full dimensions for length and height to the outside of the grounds, and not the net

dimensions. In the case of doors, the height, where there is a skirting, must be taken from the top of skirting grounds, and not from the floor. State the nature of the work and the number of coats, whether floated and set, &c., &c. Where the angles are described to be executed in Keene's or other patent cement, measure the same by the foot run, taking the length as already stated to walls, and describing as "*extra* to Keene's cement angle," or as the case may be.

Fig. 54.



Beads and **quirks** are measured in a similar manner.

If any of the foregoing work is executed on a circular surface, it must be so stated, and be kept separate from the straight work.

Lathing and plastering to partitions follows rendering to walls, and is measured in a similar manner, with the exception that where cornices occur it is customary to deduct only one-third the depth of cornice from the height, instead of one-half as described for walls. Make the additions and also the deduc-

tions as stated for walls, and keep any circular work separate from the straight. Describe the nature of the work, whether lath and plaster one coat; lath and plaster two coats; lath, plaster, float and set, &c., &c. Where the work is executed in narrow width, as to jambs, soffits, &c., it should be measured by the foot superficial and kept separate. This applies also to rendering to walls.

Measure all mouldings and architraves as already described for external work.

Cement Skirtings.—Take the lengths and collect the same on "Waste." State the height, and bill and value at per foot run. Where the skirtings are moulded, instead of the net height take the girth from floor to face of plastering of wall. Number all the angles and state the nature of the work.

Cement floors are measured by the yard superficial, stating depth and the nature of the work described, also the quality of the material.

All extra labours in making good round columns, piers, &c., to be taken at per foot run.

Cement hearths are measured by the foot superficial.

Limewhiting, colouring, whitening, distempering, &c., are measured by the yard superficial. Take the dimensions of the several walls, collecting the lengths on "Waste" of all walls of equal height, so as to bring forward in one dimension. Make the additions where they occur, and also all deductions for door and window openings, fire-places, &c. Take the cornices by the foot run, and state the girth, and where enriched and coloured state number of members and tints. It may be observed that most of the dimensions for this work can be taken from the dimensions for plastering.

Table XIII.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

Preamble.

External Work.

Portland Cement.

Rough rendering to back of parapets, &c.	At per yard super.
Plain face on brick...	,,
Ditto, jointed	,,
Ditto, circular...	,,
Ditto, to fascias, pilasters, reveals, &c.	At per foot super.
Ditto, in weathering	,,
Plain mouldings	,,
Ditto, circular	,,
Extra only to vermiculated work as sketch ...	,,
Arris...	At per foot run.
Rusticated grooves, with sketch	,,
V-jointed ditto	,,
Bead and quirk	,,
Flutes to columns	,,
Ditto, diminished	,,
Mouldings, under 6 in. girth	,,
Stops to mouldings...	At per number.
Returns to 6 in. ditto	,,
Mitres to 9 in. ditto	,,
Intersecting mitres to ditto, ditto	,,
Enriched and floriated strings, cornices, &c., &c. (stating height and giving sketch showing nature of work)	At per foot run.
Stopped ends to ditto	At per number.
Angles	,,
Ornamental parapets, including all dubbing out, &c. (giving dimensions and sketches as before)	At per foot run.
Moulded trusses, ditto, ditto...	At per number.
Caps to pilasters, including mitres and returns, ditto, ditto	,,
Ditto to columns (giving sketch and height and upper and lower diameters)	,,

Attend upon and make good after all trades.

Internal Work.

Render, one coat	At per yard super.
Ditto, two coats and set...	,,
Ditto, float and set...	,,
Ditto, to jambs, and in narrow widths	At per foot super.
Ditto, circular...	,,
Lath and plaster, one coat	At per yard super.
Ditto ditto, one coat and set	,,
Ditto ditto, two coats and set	,,

TABLE XIII.—*continued.*

Ditto, ditto, float and set	At per yard super.
Ditto ditto, to groins	,,
Ditto, ditto, but circular	,,
Follow with various forms, circular	,,
Lath, plaster, float, set, and twice whiten ceilings	,,
Ditto, ditto, soffits of stairs	,,
Ditto ditto, but fluing	,,
Plain mouldings	At per foot super.
Mitres to 8 in. moulding	At per number.
Stoppings	,,
Enrichments (stating girth and giving sketch)...	At per foot run.
Mitres to 6 in. enrichment	At per number.
Stops to ditto	,,
Keene's cement angle	At per foot run.
Bead and quirk	,,
Ditto and double quirk	,,
Ditto ditto, circular	,,
Mitres	At per number.
Stops	,,
Stops to splay	,,
Ditto, moulding	,,
Pateras 6 in. diameter, with a P.C. sum	,,
Centre flowers, 30 in. diameter, with a P.C. sum	,,
Portland cement flooring (stating thickness) ...	At per yard super.
Extra to labour to forming irregular angles, &c.	At per foot run.
Portland cement hearths (ditto)	At per foot super.
Twice limewhiting	,,
Ditto, colouring	,,
Washing, stopping and whitening	,,
Ditto, distempering to approved tint...	,,
Ditto ditto, cornices	,,
Ditto ditto, enrichments, picked out (4 in. girth) in tints	,, At per foot run.
Attend upon and make good after all trades.	

The following is quoted from the *Standard Method of Measurement of Building Works* :—"The thickness of two-coat work exclusive of keys (i.e. grooves or open joints in brickwork or spaces between laths) shall be regarded as not exceeding $\frac{5}{8}$", that of three-coat work as not exceeding $\frac{7}{8}$", and that of two-coat work in patent plasters as not exceeding $\frac{1}{2}$". Any requisite dubbing and any additional thickness shall be specially stated in the item in question."

CHAPTER X

PLUMBER

THE admeasurement of plumber's work, whilst perhaps more simple than that of some of the trades which have already been treated, requires the same degree of care in taking the dimensions, as, owing to the expensive nature of the material and labour, an error which might appear at first sight to be small, frequently turns out to be serious. In all cases take the exact dimensions of the several items, making no allowances whatever except as hereafter stated. It is usual to keep the interior and exterior work separate.

It may be as well to observe here that, whilst comparatively easy to the quantity surveyor to take off the quantities and measure up the work appertaining to plumbing, it is more difficult for a builder to estimate the same, owing to the peculiar circumstances in which the work may be executed varying in almost every job: the labour in fixing pipes depending upon the situation of the several cisterns, sinks, &c., and the construction of the different parts of the building—in some cases entailing considerably more cutting away and making good than in others—and as in some cases the builders do not even know in what portion of the building some of the connections are to be made, the force of this remark becomes the more apparent.

Milled or Sheet Lead.—Sheet lead is measured by the foot super, and reduced afterwards to weight; the specification stating the thickness of the material—as 5 lbs., 6 lbs., or 7 lbs. to the foot superficial—and, of course, by multiplying the superficial area of the lead by the number of lbs. to the foot we arrive at the total weight.

In "measuring up" it is generally advisable to gauge the

lead to ascertain the weight when the architect is uncertain as to whether the quality specified has been laid, though this course is seldom pursued.

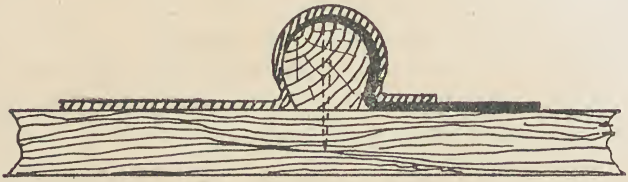
Preparatory to its being laid, however, the architect should invariably have a sample (1 foot super) cut off, and thus ascertain whether it contains the weight stated in the specification.

Commence by measuring the leadwork to roof, taking, firstly, any flats, then the gutters, and lastly, the flashings.

In abstracting, head a separate column for each of the different weights of lead.

In **flats** take the extreme dimensions each way; but when out of the square take the average, so as to obtain the net area.

Fig. 55.



Include all turnings up, drips, and rolls; in the latter case the amount to add to the width would be, in a properly constructed roll, as shown in Fig. 55, twice the circumference of the roll, less the net width of the same. This would give about 9 inches wide, and supposing the net size of the flat to be 12′ 0″ × 10′ 6″, and there are five rolls running across the flat, which is turned up each way 6 inches, the items would appear in the Dimension-book as follows:—

Length	12·0
Turns up 2/6 in. ...	1·0
	13·0
Width	10·0
Rolls 5/9 in.	3·9
Turns up 2/6 in. ...	1·0
	14·9

13·0 14·9	191·9	6 lb. milled lead in flat.

It is generally assumed that drips are not more than 10 feet apart.

Allow 6 inches for 1½-inch drips and 8 inches for 2-inch drips.

Where drips occur, add the width of the same to the length or breadth, as the case may be, on "Waste," so as to bring the whole flat forward in one dimension.

Number the **bossed** and **soldered ends** to **rolls**, and the extra labour in forming any cesspools in flats, in which case it will also be necessary to take outlet or socket pipes for communication of rain water from flat to downpipe. These are also numbered, stating size and length.

Collect the round of the walls for the flashing, on "Waste," adding 6″ for each angle to the length; and 4″ in every seven feet of the total length for tacks and passings, and 6″ for every angle; multiply by width, and state the quality of the material which is generally of less weight per foot than that to the flat. Then reduce the item to the weight. Flashings are usually 6″ wide.

In measuring **gutters**, take the entire length, adding 9 inches for turning up under slating and 6 inches against walls, and allow for drips as above, and the sum of these by the average width will give the area. It is always advisable to show how the whole of the dimensions are arrived at on "Waste." Number cesspools and outlet pipes as before.

Coverings to **dormers, cheeks, aprons**, &c., are all measured by the foot superficial, including all laps, &c. Hips and ridges are also measured in this way.

Flashings, where stepped, are generally 12 inches wide, and must be kept separate from the foregoing in the bill, and when against stone it is necessary to take a separate item for "burning in flashing," which would be simply a running dimension, stating the length.

Raking out and pointing to flashings is billed with the bricklayer, as stated therein.

Aprons are measured in the same way as flashings, and are usually 12 inches wide.

Soakers when specified are generally taken as 8 or 9 inches wide by the length of the lap added to the gauge.

Soldered dots and brass screws are numbered and described.

After abstracting the sheet lead it is brought into bill by multiplying the area by the weight of the lead per foot; thus, supposing the area of 6 lb. lead to be 150 feet, this would equal 900 lb. or 8 cwt. 0 qrs. 4 lb., to which should be added the weight of the 5 lb. and 7 lb. lead, if any, ascertained in a similar way, and the whole brought into bill in one item.

Leadwork in **dressing to finials** is measured in with the foregoing, and where extra labour is required it is expressed as "extra labour and solder in dressing lead round moulded base of finial 12 inches × 12 inches, and 16 inches high, as sketch," or as the case may be, giving sketch where necessary. Irregular work and that involving much bossing or dressing (e.g. domes) should be kept separate.

Leadwork to **safes, cisterns,** and **sinks** is kept separate from the foregoing in the bill, as shown in the Table, but measured in a similar manner, taking care to add all laps, &c. Take a running dimension of soldering or bossing to angles, and also of nailing, stating whether lead-headed or copper nailing, and whether fixed closely or otherwise. Number the overflows, giving size, &c., and state also length; also number washer and waste, and all other brasswork hereafter described.

Pipes and Brasswork.—Lead pipes are measured by the foot run, stating if "light," "middling," or "strong," and should be billed in this way, though some surveyors prefer to bill them as they are sold, viz. by weight. State the sizes and quality where taken at per foot run; also mention whether including all joints, &c., &c., although it is better to number the same as extra. Number all valves and cocks, stating sizes and giving full description, whether rivet or screw bottom, and if with screw bosses, &c., &c. Valves should be used where pressures are

high. Be particular to state whether stop, bib, or ball cocks, and if the latter, do not omit the balls, stating whether copper or zinc. C.I. gutters and R.W.P.'s are measured as explained on page 141.

Also number all washers, plugs, unions, traps, gratings, giving size and full description in each case, stating if jointed to iron or lead.

W.C. Apparatus.—The W.C. apparatus is generally numbered complete, giving full description of the quality of the different parts, that is, the kind of basin, patent valves, brass, flat or sunk plate, &c., &c., and if special closet, give name of patentee, and P. C. value, including seat, water waste preventor, &c. Number the **traps**, and take any **soil pipes** by the foot run, stating the diameter and the weight of iron or lead, per foot run or superficial, respectively. Number the **joints** and take extra labour in forming any elbows or bends. Also number all water waste preventors, with full descriptions as to chains, pulls, name of manufacturer, &c. Number brackets to support same.

Pumps.—Pumps are numbered, stating description and P. C. value, exclusive of fixing, the builder adding cost of carriage, profit, and fixing complete.

Lavatories, &c.—Lavatories, baths, and urinals are also numbered and described, with maker's name and list number, or a P. C. sum stated, the brasswork and pipes being stated separately, as previously described.

NOTE.—All work to be executed in accordance with the regulations of the water company and the local sanitary authorities of the district.

TABLE XIV.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

Milled lead, and labour in gutters, flats, flashings &c., including all solder, wall hooks, &c., complete	At per cwt.
Ditto in step flashings	,,
Ditto in linings to cisterns, sinks, &c.	,,

TABLE XIV.—*continued.*

Ditto in safes	At per cwt.
Close copper nailing	At per foot run.
Bossed and soldered angles	,,
Zinc nailing	,,
¾ in. strong drawn lead pipe (— lbs. per foot and fixing)	,,
Joints to ¾ in. pipe	At per number.
(Here follow other diameters of pipes, stating smallest first, and giving weight per foot run in each case.)	
4 in. lead soil pipe out of 7 lb. lead and fixing ...	At per foot run.
4 in. heavy C.I. down pipe with L.C.C. joints (bends, outlets, &c., at per no.)...	,,
4 in. ditto but light as R.W.P. (bends, outlets, &c., at per no.)	,,
¾ in. tested steam barrel as described including tees, bends, &c.	,,
1 in. ditto	,,
Joints to ditto	At per number.
Elbows to ditto (extra only)	,,
1¼ in. lead overflow, giving length, &c.	,,
Brass washer and waste (stating size)...	,,
Ditto, with fly nuts for slate cisterns (ditto) ...	,,
Lead D and P traps...	,,
Brass unions for lead pipe (ditto)...	,,
Barrel ditto, screwed for iron pipe (ditto)	,,
Brass washer, plug, and chain (ditto)	,,
Brass stop-cock, screw bottom with brass spanner (ditto)	,,
Ditto, bib-cock, screw bottom and boss (ditto) ...	,,
Ditto, stop-cock, ball-cock, screw bottom and boss, and copper ball (ditto)	,,
Ditto, equilibrium ball valves and copper balls (ditto)	,,
Ditto, high-pressure diaphragm stop-valves (ditto)	,,
Ends of rolls, bossed and soldered	,,
Extra to forming cesspools	,,
3 in. lead outlet pipes and soldering (stating length)	,,
Shanks or other approved siphonic action closet including mahogany seat and 3 gallon W.W.P. P. C. £———, complete, and allow for fixing and for length of 1½ in. drawn lead supply pipe	..
Patent valve closet, with supply valve, and Hellyer's regulator, sunk dish with cut glass handle, white basin	,,
Lead traps in their order	,,
Wash-hand basins and lavatories (stating size) and description and P. C.	,,
Urinals (ditto)...	,,
Baths with a P. C. sum	,,
Pumps with a P. C. sum...	,,

TABLE XIV.—*continued.*

Waste water preventor cisterns, with full descriptions	At per number.
Wrot. iron H.W. cylinder to contain 60 gallons, with brass unions, joints, and bolted cover ...	"
Give notice to the water company and pay fees for opening ground, tapping main and making good road, &c.	
Attend upon and make good after all trades.	

The allowances for leadwork, as stated in the *Standard Method of Measurement of Building Works*, are as follows :—

(*a*) For 2-in. drips 6 in.
(*b*) For 2-in. rolls 9 in.
(*c*) For passings in running lengths of coverings to ridges and hips, aprons and flashings, 4 in. in every 7 feet lineal.
(*d*) For passings in valleys and secret gutters 6 in. in every 7 feet lineal.
(*e*) For welted laps 4 in.
(*f*) For welted edges 1 in.
(*g*) For turn ups against parapets, and under slating or tiling, to a height measured vertically of 6 in. above sole of gutter.

ZINC-WORKER.

The measurement of zincwork is so very similar to that of plumber's work, that the following remarks will suffice. The difference is that whereas lead is valued by weight, zinc is charged by the foot superficial, the different qualities of the material being specified by numerals. In measuring corrugated sheets, measure by the foot superficial as for plain. In billing, therefore, it is necessary to specify the number of the gauge of the zinc, and any other observations which it may be requisite to state in regard to the workmanship.

Gutter and rain-water pipes are measured by the foot run, stating the sizes in each case, and the description. Number the stopped ends and outlets to gutters, and the heads and shoes to rain-water pipes, also the ears, swan-necks, &c., &c., giving sizes and descriptions where required.

Zinc tallboys, ventilators, and other similar items are numbered.

Zinc skylights are generally valued at per foot superficial, extra being charged for sliding or other ventilators in the same.

Metal lights are also measured by the foot superficial. It is necessary that a full description should be given, stating whether plain or ornamental.

Warming and Ventilation.

This is generally dealt with by the insertion of a provision, and an item follows this to the effect that the contractor is to allow for attendance, cutting away for and making good after the Engineer.

Table XV.

This Table has a double use ; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

Malleable zinc in flats, &c., including all labour, No. — gauge	At per foot super.
Ditto in gutters. No. — gauge	,,
Corrugated and other forms of zinc (giving description)	,,
4 in. O.G. gutter	At per foot run.
Stopped ends	At per number.
Outlets	,,
3 in. rain-water pipe	At per foot run.
Square heads...	At per number.
Shoes	,,
Ears	,,
Ventilators (giving description)	,,
Tallboys (giving description)	,,
Metal lights (ditto)...	,,
Provision for warming and ventilation	,,
Attendance upon and making good after all trades.	

CHAPTER XI

PAINTER

ADOPT the same systematic method in taking-off the painter's work as recommended for the other trades. Take firstly the outside work. In proceeding with the inside, complete one floor before commencing a second, and take the staircase last. Many of the dimensions will be the same as those of the joiner, and may be taken therefrom. In some cases where the surveyor is hurried, he neglects to measure the painting at all, but takes the superficial quantity of work to be painted from the joiner's bill, and adds thereto one-seventh of the total as an allowance for the edges. In small matters, where the work executed is very ordinary, the difference between this course and the correct way would be slight, owing to the price per yard for painting being inconsiderable, but in first-class work, or where there is a large quantity of painting required, it is not to be recommended and it should scarcely be adopted in any case. Measure the entire surface covered by the brush; that is, including all rebates, sinkings, &c., and taking the girth of the mouldings as shown in Fig. 34, page 88, *ante*. Where the work has to be "cut in on both edges," that is, worked to a line, as in the case of skirtings, &c., additional labour is involved, and the customary rule is to measure this description of work by the foot run. Paintwork in general is measured by the foot superficial which is afterwards reduced to the yard superficial, and billed accordingly. Lineal dimensions are billed at per foot. The following is the customary method of measuring the various items for painting, and the order recommended for taking them:—

Outside Work.—Sashes and frames if small are numbered, if over 12 feet super are often measured at per foot super,

Outside Work—*continued.*

stating "one side only measured" or as the case may be, and the sash squares are afterwards reduced and billed at per dozen, as shown in the Table, stating whether large or small squares. Casement frames are also numbered, and it will be necessary to state the number of lights, whether two, three, four, or six light casement, or as the case may be; also, if large it must be so specified, and this will apply equally to sash frames. By "large" is meant anything over 24 feet superficial, and by "extra large" any sashes over 36 feet superficial. Cement fronts are measured by the yard superficial. Stone cills to a brick front are taken at per foot run, stating girth. Reveals and soffits to the windows are measured by the foot run except where the front is of cement, in which case they would be measured as and with the front. Measure plinths, string courses, cornices, copings, &c., in a similar manner, and where done from ladders or scaffolding the work must be kept separate from the general item for painting in the bill, and described according to the manner in which it is executed. Eaves guttering is measured by the foot run, and the stopped ends, clips, outlet pipes, swan-necks, &c., numbered. Rain-water pipes are also measured by the foot run, numbering the heads, stating whether ornamental or otherwise; also the shoes, ears, &c., &c. Iron cresting is measured by the foot run, and all finials numbered, and iron railings are measured by the yard superficial; as are also gates, ornamental railings, balconies, balconettes, &c. Door-knockers, knobs, scrapers, and other items of a similar nature are numbered.

Inside Work.—Having completed the outside, proceed to the inside. It is advisable to observe the following rule in measuring framed and other works, namely:—to measure all projections for panels, mouldings, &c., in the dimension for the height only, and all returns in that for the width. Keeping this in mind, the work is tolerably easy.

Sashes and Frames, &c.—Measure firstly the window openings, taking the width from out to out, that is, from the edge of one architrave moulding to that of the other, and add the two returns against the wall; for the height, take from the under

Inside Work (*continued*).

side of window board to the top of architrave, exclusive of the returns to wall. If, however, there is a window back, take the dimension for the height from the floor. It will be necessary to add to this dimension the allowances for projections and mouldings in panels, *i.e.* the amount that the girth exceeds the flat, but, as has just been stated, not the returns. In ordinary square framed panels the allowance for each panel is 1 inch. The sash squares are numbered as described to "outside." When sashes are in one square, they are called "sheets" and numbered.

Boxing Shutters, &c., are measured the width by the height. For the width take the width across the window, and add to this 2 feet 6 inches, to allow for the edges and the inside of boxings, &c. The height would be obtained in the way already mentioned. The lengths for back linings should be collected on "Waste" and taken in one dimension; this by the width will give the area. The elbows are measured the width by the height, adding to the latter for any panels, &c., as before. These remarks will also apply to back flaps and sliding shutters, which are all measured in the same way. In the latter case do not omit the flap. The shutter bars are numbered.

Skirtings are measured by the foot run, stating the girth, from floor line to wall line.

Dados are measured by the yard superficial, the length by the height, adding to the latter for the projections and whatever the girth of the mouldings exceeds the flat surface of the same.

Doors and Linings at per yard super.—In measuring doors take the width of the door, including grounds and architrave, adding whatever the returns measure. Bill them at per yard super. For the height take from the floor to the top of the architrave, and add for the extra height the girth of the architrave, and also for the panels, but not the returns. The jamb linings are measured the total length, that is, twice the height of the door *plus* the length of the soffit by the width of the lining *plus* the thickness of the door (for the edges of the same) and the width of the rebate.

Inside Work (*continued*).

Strings to staircases are taken as described to other work where cut in on both edges, that is, by the foot run. Balusters, handrail, and newels are taken by the foot run. Ornamental iron balusters and newels are generally numbered.

It is thought that sufficient has been written to show readers how this description of work should be measured. Of course it will be necessary to keep the works differently treated separate, stating in each case the number of oils which are to be painted, also if knotting and stopping are included, which in new work would be the case. If flatted, take the flatting coat as extra, and where the painting is to be finished in ornamental colours, take the latter as extra; specify the tint. An example is given in the Table. Where mouldings are "cut in" in party colours they are measured by the foot run, as extra to the ordinary. By the common colours are understood the ochres, umbers, Venetian red, lamp-black, red-lead, and Spanish brown, &c.

Grained work is usually measured as extra to the painting, by which is meant that the work having been already measured for the painting, the item is taken again for the extra price for graining. It is measured in precisely the same manner as described for paintwork. State the nature of the imitation, whether wainscot, pollard oak, mahogany, bird's-eye maple, &c., and whether overgrained, and the quality and number of coats of varnish.

Staining, sizing, and varnishing is also measured in the same way as paintwork, specifying the stain and coats of varnish as before.

French polishing is measured as shown in the accompanying Table. It is often taken off with the Joiner, thus preventing the possibility of its omission, which otherwise might be the case. It is also sometimes included in the "bill" with the item to which it relates, consequently a separate bill is not made. It has been thought best to call attention to it in the manner shown. Fumigating and wax polishing are measured similarly, and the process, and the nature of the wax to be used, should be described.

TABLE XVI.

This Table has a double use; it shows the order of Abstracting and Billing this Trade and the method of Measurement.

Knot, stop, prime and paint—oils on woodwork	At per yard super.
Extra to flatting to chosen tint	,,
Four oils and one coat enamel	,,
Ditto on cement	,,
Ornamental railings, gates, &c., both sides ...	,, (Sometimes per foot run.)
Skylights	At per yard super.
Carved work	At per foot super.
Skirting 12 in. girth and under	At per foot run.
Strings	,,
Chair-rail...	,,
Handrail	,,
Balusters	,,
Newels	,,
Rain-water pipes	,,
Ornamental rain-water heads	At per number.
Ears	,,
Shoes	,,
Eaves gutter	At per foot run.
Stopped ends ditto...	At per number.
Outlets ditto	,,
Swan-necks ditto	,,
Cement reveals	At per foot run.
Cornices under —″ girth	,,
Window cills	,,
Coping edge	,,
Stone strings	,,
Stone plinths	,,
Iron cresting	,,
Guard bars	,,
Sash frames (state if one or both sides taken) ...	At per number.
Small ditto ditto ditto	,,
Two-light casement frames ditto ditto	,,
Four ditto ditto	,,
Sash sheets ditto ditto	,,
Sash squares	At per dozen.
Brackets	At per number.
Coal plates	,,
Air bricks	,,
Bolt heads	,,
Gratings	,,
Quatrefoils	,,
Finials	,,
Step-ladder	,,
Dresser	,,
Chimney-pieces	,,
Scrapers	,,
Attend upon all trades and leave all perfect at completion	,,

TABLE XVI.—*continued.*

GRAINER.

Extra grain in imitation wainscot and twice varnish	At per yard super.
Follow on with other forms of graining	,,
Ditto enrichments in panels 4 in. wide	At per foot run.

STAINER.

Staining to an approved tint and twice varnishing with the best copal varnish	At per foot super.
Fumigating, toning with asphaltum, and twice wax polishing	,,

FRENCH POLISHER.

French polishing	At per foot super.
Ditto to handrails, &c.	At per foot run.

WRITER.

Writing is measured by the inch run, stating the height of the letters. The letters are also sometimes numbered. Specify whether painted simply plain, or if shaded, double shaded, or gilt letters, &c., &c. If the writing is to be executed on a glazed surface it must be so stated, the price being considerably in advance of the ordinary for that description of work. It is also necessary to state the style of writing required, whether Block, Old English, Antique, &c., &c. Work other than the foregoing is charged at special prices.

WRITER.

Ordinary style, stating height. *Note.* This style includes Block, Old English, and German Text	At per inch run.
Ornamental style, stating height as above. *Note.* This style includes Antique and all others not included in the first item...	

GILDER.

Ceiling work should be separated from all other. State whether double gilt, and make clear whether best gold leaf or best "gold" powder on japan size is required.

TABLE XVII.

Gilding on flat wall surface	At per foot super.
Ditto on ceiling	,,
Ditto on carved work, stating height and description	At per foot run.
Moulded work, stating girth	,,
Beads, &c., ditto	,,
Carved caps	At per number.
Bosses and single items of similar nature	,,

The following is quoted from the *Standard Method of Measurement of Building Works*:—"Sash squares shall be enumerated and given in dozens, each side to be counted. They shall be classified thus—those over 2′ 6″ superficial shall be described as large, those over 5′ 0″ and not exceeding 10′ 0″ superficial as extra large, those over 10′ 0″ superficial shall be given separately and described."

CHAPTER XII

GLAZIER

THE measurement of glazier's work is as follows. Take the extreme dimensions in every case between the rebates, and make no deductions for irregular surfaces. All fractional parts of an inch are to be taken as full inches in each of the dimensions. State the description and quality of the glass, and keep the different descriptions separate; also keep separate and state the superficial area of each of the squares where they exceed 3 feet, as illustrated in the following Table, stating, firstly, that under 3 feet super in a square, then that under 4 feet, and so on; the value of the glazing varying with the size of the squares. Also take the glass in the order shown therein, namely, the inferior description firstly, and so on, to the best, though this course is dependent upon circumstances. Where so taken, however, the whole of each description of glass can be abstracted in one item; and, in many cases, an abstract can be dispensed with, and the quantities billed direct from the dimensions. Measure **semicircular sheets** as if square, taking the largest dimensions for length and height. Measure all irregular shaped squares as if square, as for semicircular sheets, and in the bill include an item at per foot run for "extra labour and risk cutting to shapes."

Glass bent to a given radius, and to elliptical or other curves or both ways of the glass, must be kept separate, and described accordingly. Keep separate all sheet glass over 3 feet 6 inches in length, and state length required, and describe as special squares of — oz. glass, — feet — inches in length. Keep

separate all ground or matted sheet glass. Coloured or embossed glass is measured by the foot superficial, the margins being taken by the foot run, and the corners enumerated, stating the sizes. In any case keep glass in wood and steel framing separate, and state how secured. State whether embossing is "French," 2 acids, 3 acids, &c.

Cutting to segmental heads may be taken by the foot run as risk and waste to segmental cutting; or it may be taken as square and billed as cut to shapes, which method is preferable.

Plate Glass.—Measure in the same manner as sheet, viz., by foot super, and keep under separate headings all squares under 3 feet with each additional foot following. Keep separate all bent or other special forms of glass and describe as such, giving sketch of the exact curve with length and height. State price per foot for all embossing or enamelling; in measuring embossing take the area of the whole square, whether part or all of the square be embossed.

It may be mentioned, in conclusion, that glazing in leaded lights must be specified separately, and fully described, stating the sizes of the squares, borders, number of roundels, &c., or the prime cost value of the whole at per foot super may be given. Number all spandrels in tracery heads, stating the extreme dimensions, including all cutting, and stating whether trefoils, quatrefoils, &c., &c.; and, if irregular shapes, giving sketches. A specimen of this description is given at the end of the Table.

Glass tiles and slates are numbered, stating the sizes and thicknesses.

TABLE XVIII.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

26 oz. sheet glass, under 3 ft. super in a square	At per foot super.
Ditto ditto, cut to shapes, measured square ...	,,
32 oz. ditto ditto, under 4 ft. super in a square...	,,
Ditto ditto, under 6 ft. super in a square	,,
16 oz. obscured sheet glass, under 3 ft. super ditto	,,
Ditto fluted ditto ditto	,,
Hartley's patent rolled plate glass, $\frac{1}{8}$ in. thick, under 5 ft. super in a square	,,

TABLE XVIII.—*continued.*

¾ in. rough plate glass in 6 in. widths, and glazing in iron grating	At per foot super.
21 oz. best patent plate glass, under 3 ft. super in a square	,,
Ditto ditto, cut to shapes, measured square ...	,,
Best polished plate $\frac{3}{16}$ in. thick, under 10 ft. super in a square	,,
Ditto ditto, under 12 ft. super in a square	,,
Ditto ditto. bent to ft. radius, under ft. super in a square	,,
Ditto ditto, ground and embossed to design, under 6 ft. super in a square	,,
Extra labour and risk cutting to shapes	At per foot run.
Small quadrant cuttings	At per number.

CHURCH WINDOWS.

The following is the customary method of measuring church windows :—

FIG. 56.

Cathedral glass and glazing in strong lead quarry lights, with narrow diapered margins at prime cost value of — per foot super	At per foot super.
Spandrels 8 in. × 6 in. extreme size, glazed as above in tracery heads	At per number.
Spandrels 2 ft. × 8 in., ditto as sketch...	,,
Trefoils 18 in. × 12 in., ditto ditto	,,
Quatrefoils 30 in. × 30 in., ditto ditto	,,

The following is quoted from the *Standard Method of Measurement of Building Works*:—"Glass shall be classified as in squares not exceeding 1′ 0″ superficial, 2′ 0″ superficial, 4′ 0″ superficial, and so on at intervals of 2′ 0″.

CHAPTER XIII

PAPERHANGER

THE measurement of paperhanger's work is fully shown in the following Table. Take the lengths and heights of walls, making the several deductions for doors, windows, fireplaces, &c., and bring to the foot superficial. By dividing the product by 63, the number of superficial feet in one piece of paper, we obtain the number of pieces required for the different apartments, but it is customary to allow one piece in seven for waste, which will make the divisor 54, and in a large patterned paper, this is sometimes reduced to 50. All portions of a piece are to be taken as full pieces; that is, the number of odd feet remaining of the various descriptions. French papers are 18 inches wide, and rarely exceed 9 yards in length, or 40 feet 6 inches super. Allowing for shortness of paper, &c., a divisor of 35 is usually adopted. Always keep ceiling papers separate. Preparing walls for paper is measured in a similar manner to the foregoing. Sizing and varnishing paper is taken at per yard superficial. It may be observed that most of the dimensions for the foregoing can be obtained from those of the plastering, and that for preparing walls will be, of course, simply the addition of the total number of pieces of paper hung.

Measure borders and hanging, by the dozen yards lineal; the more expensive friezes and dados being taken at per foot run.

TABLE XIX.

This Table has a double use; it shows the order of Abstracting and Billing this Trade, and the method of Measurement.

Prepare walls and hang paper of P. C. value — per piece	At per piece.
Ditto ditto P. C. value — per piece, and ditto ...	„

TABLE XIX.—*continued.*

Ditto ditto, P. C. value — per piece and lining and hanging to ceilings	At per piece
Strip stop and prepare walls for paper	,,
Ditto ditto lining paper and ditto	,,
Ditto ditto ditto on ceiling	,,
Marble paper, P. C. value — per piece, sizing, and twice varnishing in best copal varnish ...	,,
Ditto border, P. C. — and hanging same	At per doz. yds. run.
Lincrusta Walton, P. C. per yard and hanging...	At per yard.
— ins. Anaglypta, &c., ditto border in ditto ditto, P. C. per foot	At per foot run.
Sizing and varnishing paper, stating number of coats	At per yd. super.

CHAPTER XIV

ABSTRACTING AND BILLING

A WORD or two on abstracting and billing the quantities may well now engage our attention. These processes may appear trivial, when compared with the labour and skill required in "taking-off"—and so, indeed, they are. Usually they are placed in the hands of a junior, and to him, therefore, these observations may be particularly addressed. Many surveyors are very particular as to the manner in which their abstracts are prepared—and rightly so. Any item ought to be as readily found in the abstract as it is in the bill; and it should be so arranged that the items follow each other in the same order as they appear afterwards in the bill, the latter being, of course, merely a *summary* of the former, and should be indexed so as to afford a ready means of access to the figures. As the order of the various items in each trade has already been given in the Tables, it will be unnecessary to recapitulate them here. You can always tell whether a man has had little experience in quantities by the manner in which he prepares his abstract. Items are misplaced, and, owing to a want of forethought and experience, insufficient room has been allotted for their insertion in their proper places. It would be, of course, impossible to lay down any specific rule for the guidance of young surveyors, as, of necessity, it must be varied to suit the job; but the following remarks may not be inopportune, and may be applied in every case:—

ABSTRACTING.

Glance through the dimensions before commencing the abstract, so as to obtain an approximate idea of its nature—that is, of the class of building. If a large, first-class building, the items are likely to be multifarious. Use plenty of paper, and keep the items sufficiently far apart to admit of a few interlineations, which are likely to occur afterwards, where the items are not taken out in regular order.

Take every trade on a separate sheet of paper, except in very small jobs.

Commence by taking abstract sheets ruled as shown on pages 343–359, and write the name of the job and the trade on each sheet, keeping separate ones for each of the said trades. As each item is put under its proper head on the abstract sheet run your pen through the dimension column of the "taking-off" as shown on pages 253–342, previously adding the dimensions together in such "taking-off" where they come under one another and refer to the same item. It is convenient sometimes to take certain isolated items direct to the bill without passing them through the abstract sheet. Where this occurs cross them through in the "taking-off" in red ink, so that you can afterwards see that they went through this particular process. As each column of the "taking-off" is abstracted it should be initialed at the foot by the abstractor, and such initials should not be placed there until each item is dealt with, as sometimes it is more convenient to leave some to a later period. Each column of the "taking-off" should have been previously initialed by the person who squared it, and also by the one who checked such squaring. The junior who does this work has a splendid opportunity of learning this branch of his profession, and if he has the spirit of enthusiasm he may often detect some slight omission to which he should call the attention of his senior.

One of the most useful maxims to remember is to leave plenty of finger-posts during each process of preparing a bill

of quantities, so that reference to each item is clear and easy. It is a good practice to put the number of the column from the "taking-off" against each dimension in the abstract. A separate notebook should be kept for each job from the commencement of the "taking-off," and all queries should be entered therein as they arise, and as they are settled and entered a line should be drawn through them.

As a rule, take the cubical items firstly, then the "supers," then the "runs," and lastly the numbered items. In each case, those of the least value should be placed first, and the others should follow in order according to their relative values, the most expensive, consequently, appearing last. There is, however, an exception to this, in the case of articles measured at per foot run, which, as in the case of the mason, carpenter, and joiner, are measured in the order of their scantlings in preference to that of their value, those of the smallest scantling being taken first. Also in the case of "supers," articles that are measured by the rod or square are placed in advance of those measured by the foot. The amount of space to be allotted to the various items depends upon the size of the job, and a little experience is therefore necessary. Care should be taken to leave sufficient space to reduce the items to the standard or weight, where such is necessary, as in the case of brickwork, ironwork, &c. The method of abstracting the bricklayer, when speaking of that trade, has been explained, and it may be added that very little difficulty will be experienced in any of the trades where the person has a practical acquaintance with building. The carpenter's and joiner's trades are perhaps the most complicated, but with a little experience they are easily overcome, if the student always pursues a certain course, and the one suggested is that generally adopted, and considered the best.

Where a description is lengthy it need not be copied entirely in the abstract, but a reference can be made to the column of the "taking-off," so that when writing the bill the description can be taken from it.

A usual form of bill is shown on a small scale on page 361,

commencing with the preliminary. Be careful to insert any unusual or particular conditions that may prevail. It is well to state the nature of the works to be executed, and where additions and alterations are to be made to an existing building, it is a good plan to keep such items separate. It is convenient to make very distinct items, such as "Portland stone," "Staircase in Austrian oak," and to keep the work involved in such materials under these heads. This will save much trouble in referring to any item and in measuring up at the completion of the work.

It is not customary to bill odd inches, but if the item is over 6 inches to bill the same as an additional foot, and if under to disregard such amount, and similarly with superficial and cubic dimensions.

BILLING.

With respect to "billing," that is, bringing the summaries of the various dimensions from the abstract into the form of a bill, for the purpose of enabling the builders to price them, this is simple enough. The student has only to copy the various items, in the order in which they appear in the abstract, keeping each trade separate. In a large job, each trade has a separate bill, and the total of the estimate of each trade is carried to a summary; but in a small bill this is seldom the case, the bill being continuous. It is customary to give a description of the materials to be used in the several trades, before taking the items, such description being taken from the specification. Some, however, prefer to keep them apart from the dimensions, and place them before the quantities; in which case they form a heading.

If the usual method of measuring has not been followed, this should be stated in the preamble to the trade to which it refers.

Sketches should be neatly and clearly made where necessary in the bill, and these should be carefully checked with the rest of the bill, each page of which should be initialed at the foot by the person who has checked it.

Conditions of contract are sometimes attached to the quantities, and may, where not so attached, have a full extract of the leading points set forth in the preliminary bill. At the end of each trade it is usual to provide an item for "Attending upon the other trades," "leave all clean and perfect at completion," &c., &c.

It is advisable to send a form of tender to the builders who are asked to compete, and the following form is frequently used :—

FORM OF TENDER.

THIS FORM TO BE FILLED IN AND DELIVERED AT THE ARCHITECTS' OFFICES AT P.M. ON THE ..... DAY OF 192—.

ERECTION OF NEW SCHOOLS AT STRATFORD FOR THE WORSHIPFUL COMPANY OF CARPENTERS.

Messrs. Banister Fletcher & Sons, Architects.

.....192—

Gentlemen,

..... estimate the cost of the works comprised in the above according to the drawings which we have inspected and in accordance with specification and quantities supplied, and to the entire satisfaction of the architects at the sum of

....

....

and we are willing moreover to bind ourselves to perform and complete the said works by the ..... day of .... 192–, and will agree to pay a sum of pounds per day by way of liquidated damages for each and every day that the building is not completed by the said ..... day of .....

FORM OF TENDER—*continued.*

No variation in the work as it proceeds shall relieve us from this penalty except with the written authority of the architects.

Yours obediently,

(*Signed*) .....

(*Address*) .....

.....

To the Worshipful Company of Carpenters.

Note.—The employers do not bind themselves to accept the lowest or any tender.

CHAPTER XV

REPAIRS

THE inexperienced surveyor is often puzzled when he has to deal with repairs and alterations.

Certainly, the difficulties encountered in adding to or altering old buildings are far greater than those met with in erecting new ones. Therefore a ready expedient is often resorted to of "lumping," which though in practice is sometimes "near the mark," cannot be recommended, for the reason that the object of quantities is to give exactitude, and *not an approximation* to the measurement.

A few of the works that give difficulties in this branch of the subject may be instanced.

1st. Piecing stones or stonework.

2nd. Taking down walls out of the perpendicular, and rebuilding, with all the incidence of scaffolding of a special nature; the using in of some portion (what portion?) of the old bricks; the making good of disturbed internal work; the making good of the peculiar cornices and skirtings.

3rd. The removal and reinstatement of rotten joists, and the renewal of disturbed ceilings and other parts of the building.

4th. Raking out and pointing portions of the walls, and estimating what scaffolding (if any) will be requisite.

5th. The quantity of labour to repair decayed stone in walls and other parts.

6th. The reinstatement of drains and traps; this is difficult, as so often the defect is underground.

7th. The chimneys, chimney-pots, and making good of damaged chimney pieces.

8th. The money value of reinstatement of fittings and fixtures of peculiar design.

9th. The reinstatement of injured paintwork ; what quantity or number of coats is sufficient to make good.

10th. The value of piecing defective work.

11th. The injury to iron fencing.

12th. The taking up of broken and reinstating with sound pavement.

All these show the difficulties which attend this branch of the subject; and they are only to be overcome by experience. An outline can merely be given for guidance. It will be seen that many of the works mentioned are **spot items**, that is items which can only be valued on the spot where they are to be executed.

REPARATIONS.

Table XX.

This Table has a double use; it shows the order of Billing the items, and the method of Measurement.

Bricklayer and Tiler.

All open joints to brick flat or brick-on-edge coping	At per foot super.
Defective filletings...	At per foot run.
Defective tile creasing	,,
Pointing to pantiling	,,
Removing defective tiles, providing and bedding sound	,,
Taking down bulged, cracked, or split brickwork, and rebuilding, including scaffolding	At per rod.
Note.—Allowance must be made for the bricks that are sound, and can therefore be cleaned, stacked, and re-used.	
Red chimney-pots and setting, p.c. 5*s*.	At per number.
Pointing open joints of brickwork or raking out and pointing old brickwork, or making good defective and decayed joints of old brickwork	At per foot super.
Note.—State height from ground, and whether scaffolding will be required, and what kind.	
Cesspools, if they require emptying	At per foot cube.
Earth, soil and rubbish. Quantity must be taken and distances to which they are to be carted...	At per yard cube.
Sash frames / Door frames } The quantity of pointing required	At per foot run.

TABLE XX.—*continued.*

SLATER.

The removal of broken or defective slates. The re-fixing of loose	At per number.
The re-nailing...	At per square.
Ridging, defective or deficient	At per foot run.
Shelves, slabs, paving	At per foot super.

CARPENTER AND JOINER.

The removal of broken or decayed rafters, purlins, wall plates, joists, and replacing with sound ...	At per foot cube or run.
The removing of broken laths and replacement with sound	At per square.
The re-fixing loose boarding and weather boarding	,,
The providing new ditto in lieu of decayed, and fixing	,,
The providing sound wooden gutters and trunks, and fixing, including removal of old...	At per foot run.
Removing decayed boarding to dormers, roofs, gutters, and flats, and reinstating with sound	At per foot super.
The reinstatement of decayed skylight bars ...	At per foot run.
The removal of decayed cills of sash and door frames, and providing and fixing sound	,,
NOTE.—Be sure to notice if those to be removed are oak or deal, &c.	
The removal of broken sash-lines, and providing and fixing new	At per number.
Providing new beads	At per foot run.
Ditto pocket pieces...	At per number.
Piecing cut bars	,,
Providing and fixing sound in lieu of decayed rails and sashes...	At per foot run.
Sound panels in lieu of split in doors	At per foot super.
Making good injuries to stiles or rails...	At per foot run.
Nosing to stairs	,,
New treads	At per foot super.

MASON AND PAVIOR.

Copings to match old	As described for new work.
Curbs...	,,
Channels	,,
Sinks...	,,
Sink stone	,,
Steps and landings; piecing must only be taken where it can be done	,,
Walls or other masonry if loose or unsound ...	,,
Paving (remembering that the existing though broken may be squared and re-used), the new quantity required will only be *sufficient* to cover the space after all the stones are squared and used	At per foot super. Labour to squaring edges at per foot run.

TABLE XX.—*continued.*

Taking up sunk paving and relaying to proper level	At per foot super.
Chimney-pieces cleaning	At per number.
Ditto reinstating	,,
Ditto where chipped making good	,,
Hearths, front and back	At per foot super.
Pointing to decayed or open joints	At per foot run.
Cramps, defective	At per number.
Ditto reparation	,,
Ashlaring and other stone works, and reparation of parts broken	As new work.

NOTE.—It must be remembered that stonework can be made good by *piecing*.

PLASTERER.

Cutting out cracked or bulged ceiling, plaster and set, or plaster, float and set, state average size of holes, &c.	At per yard super.

NOTE.—If re-lathing necessary, add lathing.

Cutting out loose or bulged plastering of walls, render and set, or render, float and set	At per yard.

(Remember this will necessitate an addition in Painter or Paperhanger, of making good paper, or of colouring, as the case may be.)

Enrichments, mouldings, skirting, and cornices	As new work.

(A special price must be allowed if the work is old-fashioned or there is a difficulty in *matching* it for any good reason.)

Repairing cement work of fronts	At per yard super.
Copings	As new work.
Cornices	,,
Trusses	,,
Caps...	,,
Cills...	,,
Plinths and stringings	,,
Reveals	,,
Dressings...	,,

PLUMBER AND ZINCWORKER.

Re-fixing loose work on flats or flashings	At per foot run.
Removing defective lead or zincwork, and providing and laying new	As new work.
Soldering... ,, ...	At per foot run.
Repairing flashings, ridges, hips, valleys, aprons, dormer tops, cheeks, cisterns	At per weight.
Rain-water pipes and heads. Care must be taken that the design of present head is followed in the new work	At per foot run.
Sinks, relining	As new work.
Pipes of all other kinds...	At per foot run.
Water-closet apparatus	At per number.
Water-closet pans, T-traps	,,

TABLE XX.—*continued.*

PAINTER.

Rub down and paint in coats of oil colour ...	At per yard super.

GLAZIER.

Hack out and re-glaze	At per foot super.
Make good decayed putties	At per foot run.
Reinstate bandings and cementings of lead lights	At per number.

SMITH AND IRONMONGER.

Iron railings. (Particular care is required as to pattern ; a sketch should be given.)	At per weight.
Gratings	,,
Gates, making good	At per foot super.
,, hanging or fastening	At per number.
Rain-water pipes	At per foot run.
,, shoes	At per number.
,, gutters	At per foot run.
,, cistern-heads	At per number.
Iron doors	,,
Linings to doors	At per foot super.
Locks	At per number.

NOTE.—In taking the quantity, state if new required or reparation ; if the latter, if new springs, or what requisite has to be supplied.

Latches	At per number.
Hinges	,,
Bolts	,,
Bars	,,
Girders	At per weight.
Columns	,,
Ties	,,
Supports	,,
Balconi s...	,,

(When unsafe or defective, it will be necessary to carefully take the exact work requisite to make them secure and perfect).

PAPERHANGER.

Paper	At per piece.
Canvas	At per yard.

In taking the quantity of paper, the surveyor must try to find out if the pattern can be matched, as if so, where work is in fair order, only the damaged work must be taken ; if it cannot be, then the papering of the entire room must be taken in the quantities.

In concluding this portion of the subject, it may, perhaps, be mentioned that it is seldom that the surveyor takes the trouble to measure up what is necessary in the shape of repairs, as in most cases the specification is handed to the builder, and he prepares his estimate therefrom, taking his own dimensions from the building; and whatever is done extra thereto is sometimes charged as daywork, i.e. the time expended on the labour, and the quantity of material used. But at the same time, how is the surveyor to estimate the cost of dilapidations, for example, without measuring the various items? That in many cases they are not measured is proved by the wondrous difference in the estimates. This Table has been given, therefore, for the guidance of such as are disposed to adopt the more business-like method of treating repairs. Of course the items are taken, in many cases, in the same way as for new work; but a full description must be given as to the requirements, as the price will vary considerably in comparison with new work. Great care is necessary, therefore, when dealing with repairs, and more especially when preparing a Schedule of Dilapidations accruing under the Covenants of a lease.

The extent and nature of the Reparations are, in such cases, entirely governed by the exact wording of the Covenants, and the whole subject will be found fully dealt with in Fletcher's "Dilapidations" (Batsford).

CHAPTER XVI

ABBREVIATIONS

IN concluding the subject of the measurement of builder's work it will be useful to give some of the more common abbreviations adopted by surveyors to shorten, in some measure, the task of so much writing in describing the various items.

It has already been stated that abbreviations, whilst of service to the more mature members of the profession in taking off the quantities, are, in certain cases, inadvisable—where, for instance, the dimensions have to be abstracted by a second person, who, if he does not understand them, will lose the time, in finding out, that was gained by the person taking off. Again, abbreviations vary so. Surveyors adopt their own, and each system may be different. When, however, the person taking off also abstracts and bills, abbreviations are, to a certain extent, advantageous, owing to the saving of time; but at a future period a question may arise, and a second individual may have to go over the items. Still, there is no reason why the same system of abbreviating should not be pursued throughout the profession, and then such difficulties would less often arise. The following, therefore, are submitted as being the most usual. They are classified according to the trades, being used perhaps more extensively in that of the Joiner than in any other trade. All uncommon items or expressions should invariably be written *in extenso*.

TABLE.

Bricklayer

Item.	*Abbreviation.*
Brick	B., as 1 B. (indicating the thickness of wall) B. on edge, B. flat.
Bedded and pointed	B. & P., as Frames B. & P.
Pargeted and cored	P. & C., as Flues P. & C.
Rough cutting	R. C.
Fair cutting	F. C.
Cutting to Skewbacks	C. to Skew.
Relieving arches	R. A.
Bird's mouth	B. M.
Squint quoin	S. Q.
Cut and pin	C. & P.
Rake out, wedge and point flashings	R. O. W. & P. F.

Mason.

Half-sawing	½ Sawg.
Plain work in beds and joints	P. W. in B. and J.
Plain face	P. F.
Sunk face	S. F.
Moulded face	M. F.
Circular plain face	C. P. F.
Fair ends	F. E.
Ends cut and pinned	Ends C. & P.
Weathered and throated	W. & T.

Carpenter and Joiner.

Architrave	Archv.
Deal	Dl.
Rough	R.o.
Wrought one side	W.1.S.
Framed	Fd.
Beaded	Bd.
Bead flush	B.F.
Bead butt	B.B.
Braced	Br.
Chamfered	Ch.
Splayed	Sp.
Moulded	M.
Rebated	Rbd.
Feather-edged springer	F. E. S.
Tilting fillet	T. Fillet.
Herring-bone strutting	H. B. S.
Boarding	Bdg.

Deal rebated door frame	D. R. D. F.
Deal wrought, rebated, and beaded frame	D. W. R. & B. Frame
Double rebated and beaded jamb linings	D. R. & B. J. Linings.
Deal ledged door	D L. Door.
Six-panel deal double-margined door—the lower panels bead flush and square, and the four upper panels bolection moulded and raised one side, and bead butt at back	6 P. D. D. Margd. D. Lower P. B. F. & Sqre., 4 up. P. Bol. M. & Raised 1 S. & B. B. at back.
Deal cased frames, oak, sunk cills, $1\frac{1}{2}$ in. ovolo moulded sashes double hung with brass axle pulleys, patent lines, and iron weights	D. C. F., O.; S. C.; $1\frac{1}{2}$ O. M. S.; D. H.; B. A. P.; P. L.; & I. W.
Treads and risers, with moulded nosings, and strong fir carriages, glued, blocked, and bracketed	T. & Risers; M. N.; & S. F. C.; G. B. & B.
Wrought, rebated, and beaded outer string	W. R. & B. Outer String.
Rounded ends	R. E.
Returned ends	Retd. E.
Mitres	M.

Smith and Founder.

Rolled steel joist	R. S. J.
Wrought iron	W. I.
Cast iron	C. I.
Chimney bar	C. B.
Rain-water pipes	R. W. P.

Plumber.

High pressure	H. P.
Milled Lead and Labour	M. L. & lab.
Step flushing	St. fl.

Plasterer.

Render	R.
Render, float, and set	R. F. & S.
Lath, plaster, float and set	L. P. F. & S.
Lath, plaster, float, set, and twice whiten	L. P. F. S. 2ce. W.
Stucco	S.
Wash, stop and whiten	W. S. & W.
Distemper	Dist.

Painter.

Oils	O. or (3) (4)
Flatted	F.
Grained	G.
Varnished	V.
Stained	Std.
Knot, stop, prime and paint	K. S. P. & P.

GENERAL.

As before	A. B.
Both sides	B. S.
Circular	Cir.
Deduct	Ddt.
Extra only	E. O.
Including	Inc.
Extra labour	E. Lab.
Make good	M. G.
One side	O. S.
Prime cost	P. C.
List price	L. P.
Stopped ends	S. E.
Twice	2ce.
Three times	3ce.
Four times	4ce.

CHAPTER XVII

CUBING

CUBING, although not strictly a part of the quantity surveyor's work, is often used to obtain the approximate cost of a building.

An experienced surveyor, having seen the drawings, and being given the cubic contents of the building, with a full description of the materials to be used in its construction, and the finishings, will be able to estimate fairly closely the cost.

If the method is adopted of taking out the cubical contents of every building for which quantities are taken, and from the estimate working out the price per cubic foot, some valuable material for the comparison of relative cost will soon be obtained.

Further, it is advised that when the building is finished, the actual cost per foot cube be again tested, and this, unlike the estimate, will give the actual cost of the building as erected.

This will be found very useful at a future date, when advising clients as to the expected outlay on somewhat similar buildings, and it will be advisable to keep such memoranda available for reference.

The usual method is to take the length by the breadth, and multiply the result by the height from top of footings (not bottom of concrete) to halfway up the slope of roof. Additional

projections, as bay windows, outbuildings, &c., to be added.

Where the roof is flat, some diversity of opinion obtains as to the measurement, but the usual course is to measure to the top of the parapet.

Of course, the surveyor must remember the price per foot cube will be much affected by the description of the finishings, such as the chimney-pieces, stoves, enrichment of cornices, decorations of the rooms, &c.; also by the extent and depth of basement and position of the site.

The following considerations as to site must be borne in mind :—

1. What is the nature of the soil. The cost of the erection of the intended buildings may be considerably affected—as for example, should the land contain gravel or sand, the excavation may be a source of profit instead of loss; again, if clay, and the clay is available for brick-making or even for burning into ballast, it will affect cost.

> Note.—An instance may be mentioned which occurred in the authors' practice. They were developing an estate to be covered with houses, and one condition the builders required was permission to excavate the land on which the houses were to stand to an extra depth of 2 feet, and where the gardens were to any depth, they undertaking, after filling up the excavation, to put at least 2 feet of good garden mould; and further permission to excavate to any extent under the intended roads, using the sand to the centre line of the road, provided they filled in with hard dry rubbish. The proposal was declined as to the roads, because it was pointed out that the drains laid on such made ground would be a source of never-ending trouble. The reason this case is quoted is to impress on readers the importance of considering well the soil and subsoil.

2. What materials are available close to the site.

3. The nearest railway station, and if it has a siding, and to inquire into the rates of carriage of the goods that will be required.

> Note.—As an example of the difference of cost of a building where these points are considered, an illustration is given. An architect or his employer would have a red brick building where there were no red bricks, and the carriage was so great that the cost of the red brick exceeded the cost of good local building stone.

4. The cost of labour at the site, for although it is very usual to send the tradesmen from London, or one of the large towns, to erect the building, much expense may be saved by using local labour, especially if local materials, as for example, local stone, is used.

5. It must also be remembered that the *pro rata* cost of small buildings will exceed that of larger buildings.

6. Whether there are facilities for storage of material on the site, otherwise this item will increase the cost.

7. If the site is in the country, whether there is a possibility of obtaining lodgings for the contractor's men. Sometimes temporary buildings have to be erected for this purpose.

8. The cost of garden walls and of drainage from the buildings. The cubic price only includes usually the drainage of the house to a limited distance, although sometimes it must be carried a great distance, and through unsuitable strata of land.

Such are the leading points to be borne in mind.

With regard to the price per foot cube, it varies with not only each class of building, but also at different times, rising and falling with the prices of materials and labour; and it would therefore be manifestly impossible to fix any price in a work of this kind, which seeks to be a text-book. The recent fluctuations in the cost of lead and iron pipes afford a good illustration of the necessity of watching not merely the rise and fall of the materials, but also their comparative rise and fall. Only by doing this can a decision be made as to which to use at the time.

In the following table the *pro rata* cost only is given, as, for example, if 4*d.* will pay for a foot cube of cottage building, 5*d.* will cover the cost of the speculative builder's house, and so on. Readers are therefore again urged to keep testing the cost, as it is the only *valuable datum* to guide one.

NOTE.—It is advised that on the margin of each sheet of the calculation should be put the prime cost of the principal materials used; for example, the bricks, timber, deals, slates or tiles. Also the price paid per hour for carpenters, stone masons, and others. This will enable the surveyor to make a very exact comparison at any time he may have to refer to his data.

TABLE XXI.

Prices per Foot Cube.

The prices in this table should be regarded as average prices for the period quoted. The 1920 prices are quoted as representing the top of the rise and the pre-war prices as affording a useful basis of comparison.

	Pre-War	1920	1922
Cottages	4*d.*	...	...
Houses built by speculative builders	5*d.*	...	...
Houses built under the State-aided Housing Schemes	...	1/6 to 1/9	1/- to 1/3
Ordinary dwelling-houses	5¼*d.* to 7*d.*	1/9 to 2/-	1/4
High-class residences ...	7*d.* to 1/-	2/6 to 3/-	2/-
Churches and chapels ...	8*d.* to 1/4	3/-	2/3
Warehouses	5*d.* to 6*d.*	1/3 to 1/6	1/-

It may interest and be of service to readers to know the cost per cubic foot of the following well-known buildings, built, of course, before the war :—

	s.	*d.*
Foreign Office	1	0
General Post Office	0	8½
Bow Street Police Court	0	11
St. Thomas's Hospital	0	9
Royal Exchange	0	11
Houses of Parliament	2	6
Law Courts, London	1	1
New G.P.O. Buildings (reinforced concrete), cost of carcase	2	2
New War Office (actual cost)	1	6½

Important buildings recently completed, having been commenced in most cases before the war, cover a period of great fluctuations, rendering the price per foot cube useless as a basis for comparison. The prices given above for pre-war buildings should be at least doubled for similar buildings proposed to be erected at the present time. A similar precaution must be taken in making use of the following approximate prices for pre-war buildings, taken from the "Aide Memoire" by Major-General Cooke, revised by Colonel Seddon. The reader must check the prices from time to time and should read the description given in the footnote to enable him to realise the character of the building to which the cost applies.

TABLE XXI.—*continued.*

Description of Building.	Cost. £	*s.*	*d.*	Price per foot cube. *d.*
Billiard room, including seats	600	0	0	$8\frac{1}{2}$
*Chapel school, brick or stone, per sitting	7 to 8	0 0	0 0	—
†Church, brick or stone, per sitting	8 to 10	0 0	0 0	—
Church, iron, permanent, 400 to 700 sittings, per sitting	2 to 3	5 0	0 0	—
Drill shed, 130 ft. × 30 ft., open front with iron columns, $9\frac{1}{2}$ ft. high, slate roof on iron trusses	600	0	0	$2\frac{1}{4}$
Gymnasium, including 230*l.* for fittings for gymnasia apparatus supplied and fixed by contractor...	2600	0	0	$4\frac{1}{2}$
Hospital, including all outbuildings, per bed ...	150	0	0	7
Hospital, 8-bed ward, 31 ft. 6 in. by 20 ft., surgery 15 ft. 6 in. by 9 ft. 9 in., orderly room 15 ft. 6 in. by 9 ft. 9 in., 6 ft. verandah all round...	420	0	0	—
Infection ward, hospital, per bed	80	0	0	8
‡Mortuary		...		7
Parade, formed with 4 in. hard cased $1\frac{1}{2}$″ metal, 2 in. of screened gravel, and rolled, per yd. sup.	0	1	0	—
Quarters, officers', including mess establishment, per officer	500	0	0	8
Ditto, soldiers', per man	35 to 40	0 0	0 0	$5\frac{1}{2}$

* Chapel school, 80 ft. × 58 ft. 200 cubic ft. per seat. Roof open and ventilated, felt under slates, woodwork stained and varnished. Cement dado where required. East window may be filled with tinted cathedral glass in patterns. Central space left free for movable benches or chairs, allowing 22 in. per seat for soldiers, 24 in. for officers, and 3 ft. from back to back.

† Church.—Allow 24 in. lineal of seat for an officer, 22 in. for a soldier, and 20 in. for a child. A fair maximum interval for church seats is 3 ft. Seat should be 13 in. to 14 in. wide, angle between back and seat rather more than a right angle; front of seat 16 in. from floor. There should be movable kneeling boards to all the seats, $3\frac{1}{2}$ in. wide at top and 6 in. high. Officers' seats should have horizontal book boards fastened to back of seat, $4\frac{1}{2}$ in. wide, 2 ft. 7 in. from floor.

‡ Mortuary.—In a detached building. Floor of concrete or stone. Skylight facing North. Fresh air inlets to be made close tight if required. Air gratings 9 in. × 6 in. Dissecting table fixed North and South, and

TABLE XXI. – *continued.*

Description of Building.	Cost. £	s.	d.	Price per foot cube. d
Ditto, married soldiers, per man	175	0	0	7
Racket court	1100	0	0	—
Road, formed with 6 in. hard brick or stone, broken to 3 in. gauge, $1\frac{1}{2}$ in. of metal to $1\frac{1}{2}$ in. gauge, 1 in. of gravel binding, and rolled, per yard super	0	2	0	—
Recreation and reading rooms	2000	0	0	$6\frac{1}{2}$
Riding school...	3500	0	0	$5\frac{1}{4}$
*School, infant	...			$6\frac{1}{2}$
Stables, cavalry officers', 30 ft. wide, 40 stalls, 1-brick walls and $1\frac{1}{2}$-brick piers, rendered outside with $\frac{1}{2}$ C. $\frac{1}{2}$ S. $\frac{1}{8}$ in. thick, stalls paved with blue Staffords, passage with red bricks, no litter sheds, per stall	41	14	0	$4\frac{2}{4}$
Stables, cavalry troop, 33 ft. wide, 18 in. concrete walls, Silford stone paving, corrugated iron litter sheds, per stall...	44	10	0	—
Schools.—Cost per scholar from 111 schools, averaging 99 scholars each, built by London School Board, 7*l.* 12*s.* 4*d.* to 10*l.* 1*s.* 10*d.*; average	9	2	9	—

NOTE.—The buildings, when not specially described, are of brick, at ordinary prices; for stone, add from 15 to 20 per cent.

head rest. Sink 2 ft. 10 in. by 2 ft., with waste plug and $\frac{1}{2}$ in. bib cock. Ventilators: outlet gratings at foot of extracting shafts.

* Infant Schools.– Schoolroom 28 ft. × 17 ft. × 14 ft. to collar. Allow 96 cubic ft. per seat. Roof ventilated and ceiled to collars, with a hinged flap in ceiling. The superficial area per infant should never be less than 8 ft.

CHAPTER XVIII

PRICED SCHEDULES

THE authors have been asked to state the usual method adopted where, either from want of time, or from the impossibility (or inadvisability) of measuring certain works beforehand, it is decided to build by a *schedule of prices*.

The following is our own method of procedure. Having before us the drawings of the proposed building, we turn to, say Table II., and probably will find that this Table contains most of the items required in the building, or, if there is anything special, we add such items, and omit any others that may not be required for the execution of the particular building. We then turn to the next Table, and treat that in the same way.

Having thus completed all the trades, and written preambles to each, and the general preamble, it is usual to have them lithographed and issued to those builders who are invited to tender. On the day appointed for opening the tenders, some difficulty will probably arise in discovering whose *priced schedule* it is desirable to accept, because, in all probability, one builder *will be lower* in one item than another, and higher in some other items. Before receiving these tenders, it is a good plan to make, before the day, calculations of the different trades, so as to be able to advise one's client as to which items are most important, because a builder may put all the items of which little will be required at a very low price, and yet, by putting a trifle higher than the other competitors on the items of which large quantities will be used, may increase the cost of the building.

Beyond the serious drawback of the difficulty of discovering which tender will really give the client the cheaper building, is the further disadvantage that the client does not know the total amount that the building will cost.

In most commercial matters it is usual for a man to know beforehand what he has to pay, so that he may know whether he can afford it—whether he is justified in incurring the outlay. Doubtless one reason why architects are not always employed is the supposed uncertainty of the cost of buildings erected from their designs : it is therefore deemed necessary to caution the young practitioner not—unless there is some strong and special reason—to build by this method, but by quantities in the usual way, and have the priced quantities of the successful builder lodged for pricing extras and omissions, if there are likely to be many. The Government of this country has much work done by priced schedules, and these schedules are revised periodically. This is an excellent method for them to pursue in the restoration of forts, barracks, and other works where the *quantity* of work that will be required is uncertain.

If priced schedules are required, the Tables already given should be of assistance as a basis for the purpose.

PRICED SCHEDULES.

Read paragraph two of this chapter, which explains how to use these Tables for this purpose.

See Table	I.	Excavator.	*See* Table	XI.	Bellhanger.
,,	II.	Bricklayer.	,,	XII.	Electrician.
,,	III.	Tiler.	,,	XIII.	Plasterer.
,,	IV.	Slater.	,,	XIV.	Plumber.
,,	V. }	Mason.	,,	XV.	Zinc Worker.
,,	VI. }		,,	XVI.	Painter.
,,	VII.	Carpenter.	,,	XVII.	Gilder.
,,	VIII.	Joiner.	,,	XVIII.	Glazier.
,,	IX.	Smith & Founder.	,,	XIX.	Paperhanger.
,,	X.	Gasfitter.	,,	XX.	Reparations.

PRICES FOR BUILDING WORK AT END OF 1922 (LONDON).

		£	s.	d.
Excavate surface trench and cart away ...	per yard cube	0	16	0
Planking and strutting	,, foot sup.	0	0	6
Portland cement concrete foundation (1–7)	,, yard cube	2	0	0
Reduced brickwork in flettons in lime mortar	,, rod	35	0	0
Extra only in cement mortar	,, ,,	3	0	0
Extra for pointing with a struck weather joint	,, yard sup.	0	2	0
Double course of slates in cement as damp-proof course	,, foot sup.	0	1	3
½-in. Asphalte damp-proof course	,, yard sup.	0	7	0
¾-in. Asphalte flat in two thicknesses	,, ,,	0	8	9
6-in. Skirting and fillet	,, foot run	0	1	3
Welsh countess slating to 3 in. lap	,, square	4	15	0
Roof tiling to 4-in. gauge nailed every 4th course	,, ,,	4	10	0
Ridge tile	,, foot run	0	2	6
Bath stone and all labour	,, foot cube	0	11	6
Portland stone	,, ,,	1	1	0
York stone in templates, etc.	,, ,,	0	16	0
Fir framed in plates	,, ,,	0	4	9
,, floors	,, ,,	0	6	0
,, roofs	,, ,,	0	6	6
,, roof trusses	,, ,,	0	7	0
Flat boarded centering to concrete floor, etc.	,, square	2	10	0
Centering to arches	,, foot sup.	0	1	6
2 × ¾ Battening for slates	,, square	0	12	0
1-in. Rough roof boarding	,, ,,	2	0	0
Roofing felt	,, ,,	0	15	0
1¼-in. Deal tongued and grooved flooring ...	,, ,,	2	15	0
2-in. Deal moulded casements	,, foot sup.	0	3	0
Deal-cased frames and sashes	,, ,,	0	4	0
2-in. Deal four panel square framed doors ...	,, ,,	0	3	3
2-in. do., moulded both sides	,, ,,	0	3	9
4½-in. by 3-in. Deal rebated and moulded frames	,, foot run	0	1	4
1¼-in. Deal jamb linings	,, ,, sup.	0	1	9
1-in. Shelving and bearers	,, ,,	0	1	0
1¼-in. Deal treads and 1-in. risers	,, ,,	0	2	3
1½-in. Deal framed strings	,, ,,	0	2	0
3 × 3 Mahogany moulded handrail	,, run	0	5	0
Render, float and set walls	,, yard sup.	0	3	0
Lath, plaster, float and set ceilings	,, ,,	0	4	6
¾-in. Portland cement screed for paving ...	,, ,,	0	2	6
Keene's cement plain face	,, ,,	0	4	0

PRICES FOR BUILDING WORK AT END OF 1922 (LONDON) *continued*—

	£	s.	d.
5-in. Cast iron eaves gutter ... ... ,, foot run	0	3	9
3-in. ,, rain water pipe ... ... ,, ,,	0	2	6
Rolled steel joists and fixing ... ... ,, cwt.	0	17	0
Compound girders ... ... ,, ,,	0	19	0
,, stanchions ... ... ,, ,,	1	2	6
Milled lead and labour in flats, flashings, etc. ,, ,,	2	12	6
Copper nailing ... ... ,, foot run	0	0	6
½-in. Lead service pipe ... ... ,, ,,	0	1	3
2-in. Lead waste pipe ... ... ,, ,,	0	3	3
4-in. Lead soil ... ... ,, ,,	0	6	0
1½-in. Lead traps and joints ... ... each	0	12	6
21-oz. Sheet glass to wood ... ... per foot sup.	0	1	0
Obscured sheet ... ... ,, ,,	0	1	6
⅛-in. Rolled plate ... ... ,, ,,	0	1	0
Twice distemper walls ... ... ,, yard sup.	0	1	0
Knot, prime, and four oils on wood ... ... ,, ,,	0	3	9
Prepare and hang paper ... ... ,, piece	0	3	0

VARIATIONS IN PRICES OF THE PRINICPAL BUILDING MATERIALS SINCE 1914 (LONDON).

Material.	Unit.	1914.			December 1918.			December 1919.			December 1920.			December 1921.			December 1922.		
		£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Ballast, Thames	yard cube	0	5	9	0	17	0	0	16	6	0	19	6	0	14	0	0	13	6
Sand	,,	0	7	0	0	16	0	1	0	0	1	5	0	0	19	0	0	16	0
Cement, Portland	ton	1	17	0	3	8	0	3	13	6	4	7	6	3	17	6	3	3	0
Lime, grey stone	,,	1	8	0	2	7	0	2	15	0	3	15	0	3	5	6	2	16	6
Bricks, Flettons	1000	1	14	0	2	7	8	2	17	0	3	17	0	3	12	0	3	1	0
,, Stocks	1000	1	16	6	3	3	6	4	1	6	5	1	6	5	0	0	4	2	0
Stone, Portland	foot cube	0	2	5	0	2	11	0	3	7	0	5	0	0	5	0	0	4	7
,, York	,,	0	2	10	0	4	9	0	6	0	0	13	3	0	8	0	0	6	0
Slates, 20×10 Welsh	1200	11	13	0	23	15	0	27	10	0	36	10	0	36	10	0	31	15	0
Tiles, Broseley	1000	2	10	0	6	2	6	6	7	6	7	5	0	8	10	0	6	10	0
Hip or valley	per doz.	0	4	0	0	14	0	0	14	0	0	15	0	0	15	0	0	8	6
Timber carcassing	standard	15	0	0	45	0	0	45	0	0	45	0	0	38	0	0	30	0	0
,, yellow deal	,,	22	0	0	50	0	0	55	0	0	55	0	0	47	0	0	47	0	0
1-in. deal flooring	square	0	15	0	2	6	0	2	2	0	2	12	6	1	5	0	1	5	0
Plasterer's laths	bundle	0	0	10	0	4	0	0	3	9	0	5	6	0	4	0	0	3	9
Nails, cut	ton	12	5	0	28	10	0	32	10	0	45	0	0	28	0	0	24	0	0
2½-in. cast iron rain water pipes	yard	0	1	0	0	3	0	0	3	0½	0	3	2	0	2	1	0	2	1
5-in. do., gutter	,,	0	0	10	0	2	6	0	2	9	0	3	0	0	1	10	0	1	10
Steel joists	ton	9	10	0		—		28	0	0	36	0	0	17	0	0	14	0	0
Sheet lead	,,	23	0	0	51	0	0	48	0	0	42	0	0	37	10	0	34	10	0
White lead	,,	29	15	0	72	10	0	75	0	0	69	5	0	58	0	0	54	0	0
Red lead	,,	28	10	0	58	0	0	50	0	0	50	0	0	42	0	0	38	0	0
Linseed oil	gallon	0	2	6	0	8	7	0	9	7	0	5	3	0	3	5	0	3	5
Turpentine	,,	0	2	10	0	10	9	0	11	0	0	9	10	0	6	2	0	8	4
Varnish, pale copal	,,	0	10	6	0	17	0	1	1	6	1	1	6	1	1	6	1	0	0
Glass, 21-oz. fourths	foot super	0	0	3	0	0	8	0	0	8½	0	0	8	0	0	6½	0	0	5½

RATES OF WAGES, SEPTEMBER 1922.

	Bricklayers.		Masons.		Slaters.		Carpenters Joiners.		Plasterers.		Plumbers.		Painters.		Labourers.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Aberdare	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Bedford	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	0½
Birmingham ...	1	8	1	8	1	8	1	8	1	8	1	9	1	8	1	3
Blackburn ...	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Bradford	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Brighton	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	0½
Bristol	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Cambridge ...	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	0½
Cardiff	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Chatham	1	4	1	4	1	4	1	4	1	4	1	4	1	4	1	0
Colchester ...	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	0½
Derby	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Durham	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Exeter	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	3½	1	0½
Folkestone ...	1	4	1	4	1	4	1	4	1	4	1	4	1	4	1	0
Gloucester ...	1	5	1	5	1	5	1	5	1	5	1	5	1	4	1	0¾
Guildford	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	0½
Hull	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Leicester	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Lincoln	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Liverpool	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	5½
London	1	8	1	8	1	8	1	8	1	8	1	8½	1	7	1	3
Manchester ...	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Newcastle-on-Tyne	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Northampton ...	1	6½	1	6½	1	6½	1	6½	1	6½	1	6½	1	6½	1	2
Norwich	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	0½
Nottingham ...	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Oxford	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	0½
Plymouth ...	1	6	1	6	1	6	1	6	1	6	1	6	1	5	1	1½
Portsmouth ...	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	0½
Reading	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	0½
Rochester ...	1	4	1	4	1	4	1	4	1	4	1	4	1	4	1	0
St. Helen's ...	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Southampton ...	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	4½	1	0½
Sunderland ...	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	3
Worcester ...	1	6½	1	6½	1	6½	1	6½	1	6½	1	6½	1	6½	1	2
York	1	6½	1	6½	1	6½	1	6½	1	6½	1	6½	1	6½	1	2

VARIATIONS IN RATES OF WORKMEN'S WAGES SINCE 1914 (LONDON).

Date.	Mechanic.	Painter.	Labourer.
Aug. 1914	11½*d.*	9*d.*	8*d.*
July 1916	1/0½	10*d.*	9*d.*
April 28, 1917 ...	1/1½	11*d.*	10*d.*
Oct. 20, 1917 ...	1/3¼	1/0¾	11¾*d.*
Jan. 11, 1918 ...	1/3¼ + 12½ %	1/0¾ + 12½ %	11¾ + 12½ %
July 27 1918 ...	1/5 + 12½ %	1/2½ + 12½ %	1/1½ + 12½ %
Feb. 15, 1919 ...	1/9	1/6	1/5
May 3, 1919 ...	1/9	1/8	1/5
Nov. 15, 1919 ...	1/11½	1/10½	1/8
May 1, 1920 ...	2/0½	1/11½	1/9
May 29, 1920 ...	2/4	2/3	2/1
May 16, 1921 ...	2/2	2/1	1/11
July 1, 1921 ...	2/2	2/1	1/10
Aug. 1, 1921 ...	2/1	2/–	1/9
Sept. 1, 1921 ...	2/0½	1/11½	1/7½
Sept. 1, 1922 ...	2/–	1/11	1/7
April 1, 1922 ...	1/10	1/9	1/5
June 1, 1922 ...	1/8	1/7	1/3
Dec. 31, 1922 ...	1/8	1/7	1/3

Note.—Add ½*d.* to mechanics' rate for plumbers.

CHAPTER XIX

METHODS OF MEASURING ADOPTED IN THE NORTH

THE following statement of the methods recommended by the Manchester Society of Architects is included by the courteous permission of the Council of the Society. The principal divergences from the practice obtaining in London are noted in brackets.

GENERAL STATEMENT OF THE METHODS RECOMMENDED BY THE MANCHESTER SOCIETY OF ARCHITECTS TO BE USED IN TAKING QUANTITIES AND MEASURING-UP WORKS.

October, 1866.
Revised January, 1873.
Further Revision, July, 1886.

In taking quantities it will always be desirable to bear the character of the works in mind, and so to measure and describe them as to give parties estimating the clearest idea, and at the same time in the most concise manner, of their cost and character.

In measuring-up works already executed, it is of course only necessary to ascertain on what principle of measurement the prices have been determined, and then proceed accordingly.

GENERALLY.

Fees to Corporation, hoarding, propping sides of foundations or walls, and use of water for the different trades, to be mentioned in the trade that has to provide them, or under the head of charges to be borne by the General Contractor. (If the right of advertising on hoarding is to be reserved by the proprietor, it should be so stated).

Each trade to provide its own scaffolding, unless specially mentioned.

Each trade to provide its own mortar.

Protecting masonry with slabs, &c., to be put by preference in Carpenter's work.

Expense of Watchman, making good damaged work, &c., to be inserted as occasion may arise.

Each trade to provide for the expense of the attendance on the other tradesmen, and for cutting holes and making good, &c.

When the General Contractor is expected to be responsible for damage by fire, an item for insurance to be put in the Quantities, by preference in the Carpenter's work.

Any provision of sums of money or values for articles, shall denote the net cash to be paid by the builder, exclusive of his profit and of the cost of materials and labour required for fixing, which, however, should be fully stated.

Clerk of Works' office and custody of drawings to be provided for.

EXCAVATOR.

1. Stripping surface soil deep, and wheeling in heaps yards run, to be measured in superficial yards.

2. Excavating to be given in cubic yards, measured to 3 inches beyond the outer edge of footings; with extra beyond for batter of sides of excavation, depending on depth and nature of soil. [NOTE.—Six inches is often allowed in London practice.] State whether material is to be left on the ground or carted away; and if wheeled, state the distance. Extra price for

wheeling every twenty yards run additional. The excavating for each successive depth to be kept separate, and the nature of the material to be excavated to be mentioned if possible.

3. Excavating to trenches for walls, &c., to be measured in cubic yards, and to be kept separate from the above, as also for underpinning or any special work that has to be executed separately.

4. Filling in and ramming to foundations, to be given as an item, or, if thought desirable, to be done by day work.

5. Clearing away rubbish from time to time, to be given as an item.

6. Filling in or forming foundation for paving and flagging to be taken in superficial yards, and state depth and material; or add this to the item of paving or flagging in Mason's work.

7. Drains to be given in lineal yards with description thereof, to include cutting trenches and laying; describe method of jointing and filling in; and state average depth of each kind, and when practicable, mention whether in rock or other kind of ground.

8. Junctions, bends, &c., to be counted extra beyond the length of drains.

9. Cutting trenches and filling in to gas and water pipes (see Plumber), to be given in lineal yards.

10. Wells, cesspools, eyes, &c., to be given with proper particulars, as the work may require.

11. Keeping foundations clear of water beyond ordinary rainfall, and for propping the streets or adjoining buildings, to be given as items.

BRICKSETTER.

1. Give description of materials, and mortar, and quality of work. The work, unless otherwise mentioned, to be reduced to one brick thick, and called 'Brick-length Walling,' in yards super. [Note: In London practice this is billed as reduced brickwork of $1\frac{1}{2}$ bricks thick.] If sand, gravel, or water on the spot is not intended to be used, state so. If there be much

work of half a brick only, it is desirable to mention it. Where a building is lofty, it is desirable to divide the work into stages vertically.

2. To obviate any misunderstanding as to so-called trade usages, with regard to other materials, as stone, &c., built in, it is proposed to measure the net quantity of brickwork to be executed; deducting entirely all labour and materials in openings having more than 100 square feet "*face*" measure, and deducting materials only (leaving "hollows" for labour) on the following :—

a. All other openings than the above, the shape they are actually executed, provided they are openings in the walls and built above with the same materials.

b. All cills, strings, cornices, &c., and other masonry or dressings built in, and being six or more inches high. The "hollows" thereon being assumed to pay for the labour in providing proper bed therefor, filling up thereto, and pointing up.

c. Fireplace openings from underside hearth, and all flues to be deducted as "hollows," and the lineal dimensions of flues (with size, if various) to be given for extra labour forming, pointing, and coring out. [NOTE: Flues not deducted in London practice.]

3. Joists and beam ends, wall plates, door frames, band and gudgeon stones, codge stones, beam stones of ordinary dimensions, not to be deducted if built in with the work. [NOTE: Rough cutting and raking cutting measured in London practice.]

4. All walls finished with a bevelled upper edge, as to gables, eaves, &c., to be measured to 3 inches above the average height; and the lineal dimensions of "beam filling" between spar feet and of "gable cutting" given.

5. Any work intended to be whitewashed, to be measured "superficial," over all openings for pointing. [NOTE: Net quantity measured in London practice.]

6. All splay cutting (with width), bevelled arrises, moulded arrises, bands of fancy work (with description), cutting to any

shape not square, for ramps, hood moulds, &c., &c., double or other shaped reveals to be given lineal.

7. Stops to chamfers, and other single points requiring special labour, to be counted.

8. All brickwork in projecting bands, cornices, &c., to be measured as walling, the labour as above in No. 6.

9. Facing to be measured super for "extra price over common"; and the nett quantity executed only to be given, after deducting all strings, cills, &c., &c. All openings less than 100 feet to be deducted and kept separate as "hollows for extra labour over common work," to pay for the labour, plumbing and setting out. Reveals to be measured for facing separately. [NOTE: Not done in London practice.]

10. Cavity walling to be measured the actual thickness of the bricks, as for instance, to be measured at 1½ bricks or 2 bricks, &c., as the case may be; and the superficial dimension of the wall measured across all openings under 100 square feet, as "extra labour and extra materials for bond, forming cavity walls." The nature of the ties to be mentioned. [NOTE: No such allowance is made in London practice.]

11. Work in cement, or other material than the general run, to be taken for "extra price over mortar," and the description of the material given.

12. Backing up to ashlar walling to be kept separate from the ordinary walling.

13. Wrought-iron bond, if used, to be given in lineal feet.

14. Common relieving arches to be counted with average span, and separated into various thicknesses of wall, and number of rims in depth, and this to cover all extra labour and materials.

15. Arches in facing to be either counted, with spans, depth, and soffit given, and this to include all extra labour and materials, including skewbacks, and cutting super-imposed work to fit the rake; or else measured super as executed, for "extra labour and materials over facing"; girthing the face and soffit net, and measuring separately the skewbacks, and cutting super-imposed work to fit the rake, when the shape of the arches requires it.

16. Ordinary arching to fireproof floors, &c., to be measured stuff and work in square yards, with description and thickness, girthing along the line of average thickness, and measure the lineal feet of skewbacks with description. Groins to be measured lineal. Allow for cutting and fitting to ironwork.

17. Trimmer arches to be counted, with average size for "stuff and work," including backing-up, and state whether solid or concrete backing is intended. [NOTE: Often measured by the foot super in London practice.]

18. Backing to arches that have been measured as in No. 16, to be taken super, with average thickness and description of material.

19. Damp-proof courses to be given lineal with width.

20. Risers for slopstones, steps, flag shelves, &c., to be counted for "stuff and work," or if measured as walling, to be kept separate, and so stated.

21. Wine bin divisions measured super, with thickness, and kept separate, or with the above.

22. Eyes, air-grids, chimney pots, setting grates, or other special items, to be counted, with description, and the mode of executing the work.

23. Covering walls to protect them on special occasions, and manner of doing it, to be added to the Bricksetter's contract.

24. Items: To cleaning down, making good, pointing, &c., at finish.

25. It would be well to call the Contractor's attention to the fact that his price must include making good any damage done by frost.

26. Concrete in foundations to be measured by the cube yard.

MASON.

1. Plain ashlar walling and parpoint walling to be measured super, net work, for "stuff and work," giving the kind of face and average sizes, and bed of the stones; allowance to be made

where square blocks have to be cut to suit shaped openings, ramps, &c., and defining the number and dimensions of the through stones. Reveals to be measured extra. Rubble walling up to 18in. in thickness to be measured superficial and described; above that thickness to be measured in the cube and described.

2. Other masonry to be measured as hereafter mentioned, keeping the stone and labour separate, or when conducing to the better understanding of the work, as in strings, &c., to be measured in lineal feet, "materials and labour," with sufficient particulars to enable the number of joints to be included; count the fair ends, quoins, &c.

3. Work in chimneys, or cornices, &c., requiring special appliances for hoisting, or at considerable heights, or of extra dimensions, to be kept separate, so far as the material, hoisting, and setting are concerned; the labour, when done on the ground, may be thrown in with the rest.

4. Under the head "stone" must be included the labour in hoisting and setting, and state approximately the quantity to be set above 40 feet from the ground.

5. Special appliances for hoisting, such as travelling cranes, &c., to be specially mentioned. [NOTE: In London practice the heights are usually stated but the contractor is left to use his own means.]

6. In measuring the cubic feet of stone for other than the work previously mentioned, 1 inch each way beyond the net dimensions of each block, when worked, to be added. [NOTE: Not usual in London practice.]

7. In measuring the labour, the necessary operations of the workman to be followed. The beds and joints of each block to be measured, and kept under that head; and it will conduce to more easy pricing of the work when these can be given in lineal feet, with the average width, particularly for strings, cornices, architraves, jambs, &c.

8. The work exposed to sight to be classified under its different heads, mentioning where bosted, tooled, or polished, and giving plain work, sunk, moulded, sunk and moulded (this

when the straightedge will not work the block from a mould applied at each end), weathered, sunk and weathered, and the various kinds of fancy surfaces, and clearly distinguishing from straight work that which is raking, circular, circular on circular, &c.

9. Raised or sunk panels will require that face of the block to be first measured for plain work (for setting out on), then the face work, and the lineal feet of margin of its particular kind.

10. The points from which to girth moulded work will be best ascertained by a consideration of the manual process followed in its execution; in some strings it will thus have to be girthed from wall above to wall below; in other instances, as cornices, where the top is measured for sunk and weathered work, the moulded work will girth from the nose only.

11. All mitres to be counted, with the girth of the mould, &c. they belong to, and state whether internal or external.

12. Throats to be clearly given, either separately in lineal feet, where the soffit has been measured as a "bed," or, in other instances, girthed in with the moulded work.

13. The back of masonry will not generally require any notice, except where it shows through a wall that is not plastered, and in some quoins that bed more than the thickness of the walls, where the sinking must be taken into account. Tooling or rubbing backs of architraves, mullions, &c., to bed frames against, to be measured lineal, and all checking out for the same purposes to be measured in the same way.

14. Holes for flues, timbers, &c., to be counted.

15. Rough sinking down as a preparation for the Carver to be given superficially, girthing round the cap, truss, &c., &c.

16. All carving to be clearly set forth with reference to the drawings or special marginal sketches; running ornaments to be given lineal with the girth; but caps, bosses, trusses, modillions, pateræ, &c., numbered. State if Carver is to find his own scaffolding.

17. Ordinary window cills to be numbered, with dimensions.

18. Others than these to be taken cube, and the labour taken

out as before, and in addition the seats counted for jambs, mullions, &c.

19. As tracery will generally be of a description between the work of an ordinary mason and that of a carver, the most satisfactory way would appear to be to measure one face over all the work as plain work for setting out on, and then number each piece of tracery with its dimensions and reference to the drawings or special marginal sketch for the remainder of the labour, but measuring separately any groove or rebate for glazing.

20. Mullions and other work with little material, as compared with the labour, to be measured lineal, "stuff and work" with particulars or sketch, and give general indication of the lengths.

21. Columns to be girthed for circular work (with or without entasis, as the case may be), and flutes measured lineal with sketch, and numbers of stops counted; if in extra lengths, keep both materials and labour under a separate head.

22. Rustics and other channeled work to be measured lineal (after the surface and beds have been fully measured) with sketch.

23. Cramps and dowels to be counted, with average size, or weight, if metal, and letting in and running; and state whether Mason is to find lead.

24. Copings, where worked out of flags or thin material, to be measured lineal, and net as fixed, with proper description of each face and mode of jointing. All knees, apex, and foot stones to be counted with sketch or particulars of labour thereon. Any perforations for flues, &c., to be counted.

25. Flagging to be measured net, in square yards, with proper description of materials, average and minimum size of flags, method of jointing and laying; and whether Mason to provide bed and mortar, and if so, describe same. All exposed nosings to be measured lineal; and any perforations or notchings out to fit special corners or other objects, to be counted or measured, and the portion so notched out of any flag included in the gross measurement.

26. Flags, if required to be above 12 feet super, to be kept under the head of "landings."

27. Any special mode of jointing flags or landings, as lap or joggle joint, to be measured once along the joint.

28. Hearths to be given in superficial feet, and if the fore and back hearth be in one piece, state "large sizes," and count the notchings for jambs.

29. Paving to be measured net, with description of sets and method of laying, and whether Mason finds the bed or not.

30. Keep each kind of tiling to floors separate, and state whether and what kind of bed is to be provided.

31. Band and gudgeon stones, codge stones, beam and pillar stones to be counted, with dimensions and particulars of work thereon, and whether Mason has to let in and run any iron work therein, or to find lead therefor.

32. Steps, where practicable, are best counted, with dimensions and particulars; solid steps may be taken lineal, with average length, and count the number for pinning in, and also the worked ends. All letting in of balusters, newels, &c., to be clearly given, and joggle or notched joints measured.

33. Landings, half spaces, &c., to be either counted with description, or taken super, with all joints, worked edges, and soffits measured.

34. Letting in of grids to drains, coal places, areas, &c., to be counted, and state whether lead to be found, and if the stone or curb has to be rebated, state so.

35. Area and other curbs to be taken lineal, and if cramped, so stated, with average lengths of the stone.

36. Dubbing out with flags, for cornices, &c., for the Plasterer, to be taken lineal, with width and thickness, and any special labour.

37. Slopstones, &c., to be either counted with particulars or measured super with the labour; the sinking to be girthed bottom and sides each way; mention the hole for grid, and whether to be fixed by the Mason.

38. Mason's work generally requires very minute subdivision in measuring, and a knowledge of the method of

working stone is essential to the proper performance of that duty. Each necessary operation of the workman should be taken into account, although it may appear that the same surface (as in panelled or enriched work, &c.) has to be measured more than once for different descriptions of work.

39. Clean down and leave all perfect at completion, as an item.

CARPENTER AND JOINER.

1. Unless a special provision be made that timber and joiner's work must finish net to the dimensions given (the waste being calculated then in the price), it must be understood that all work will follow the original marking or "pricking" for sawing, thus each sawn face would reduce the scantling by nearly $\frac{1}{16}$ in. or half the width of sawcut, and each wrought face would entail a further reduction of about $\frac{1}{16}$ in. A 12 × 6 in. scantling would thus measure $11\frac{7}{8} \times 5\frac{7}{8}$ in. full, and a 2 in. door would finish $1\frac{3}{4}$ in. full.

2. Labour framing and nails to be measured super, in square yards, for floors, roofs, and ceiling joists; keeping the different descriptions, whether for single-joisted or framed, separate, and defining the mode of framing, and taking the dimensions over the extremities of the timbers, or the timber may be taken cube and to include the labour. [NOTE: Labour and nails not measured in London practice.]

3. Labour framing principals to be measured the length of span, with wallhold, and separating the different kinds; the same with framing trussed partitions.

4. Ordinary studded partitions and filling in to the above to be taken super, in yards, for "stuff and work," with scantlings and distances apart. [NOTE: Not usual in London practice.]

5. Labour framing hips and valleys, in lineal feet. [NOTE; Not usual in London practice.]

6. Gutters lineal, or if wide, super, and state if with bearers; count cesspools, with dimensions.

7. The timber to be taken cube when sawn to scantling, keeping, as far as practicable, large scantlings, as beams, purlins, large joists, &c., separate from small, as spars, plates, &c. Beams are best given in lineal dimensions, and when over 35ft. long, should be kept separate. [NOTE: This is only done in London practice when of unusual sizes.]

8. When conducing to the better understanding of the work, however, large timbers, or those with special labour, to be measured lineal, and properly described.

9. Deals, planks, and battens used for joists, &c., to be taken superficial or cube.

10. Planing or other special labour to timbers, measured super or lineal in feet, and stops to beads or chamfers counted.

11. All timbers to be measured net lengths as fixed, and trimmings for hearths, wells, skylights, &c., counted. [NOTE: Not so done in London practice.]

12. Angle beads, staff beads, and tilting fillets, in lineal feet.

13. Bolts, dogs, straps, &c., of iron, to be counted, keeping joint bolts separate from others.

14. Nogs and templates to be counted, or kept separate under a cube or lineal dimension.

15. Snowboards, in lineal feet, with width and description.

16. Ridge and other rolls, and hip and valley boarding, in lineal feet, with width. [NOTE: Usually measured per foot super in London practice.]

17. Centering, in square yards, except centres for doors and window openings, &c., which are to be counted, with span and width. In extensive fireproof works, a small quantity of centering will often suffice, if "taking down and refixing" be given, together with the necessary staying.

18. Cornices and face boards in lineal feet, with description and particulars of bearers, &c., and count mitres to the former.

19. Ordinary flooring in square yards net; mitred margins to be counted. [NOTE: Often included in the description of the floor in London practice.]

20. Pugging to floors, measure across the timbers and state description, whether on slabs and fillets, or laths, and if filled in, describe.

21. Skirtings in lineal feet as fixed, with dimensions and description, and state whether to include grounds; where above 7 inch, count all mitres and ramps, and labour housing to architraves, chimney-pieces, &c.; if tongued to floor boards, state so.

22. Door casings and frames in lineal feet (allowing length for tenons, &c.), and state whether framed, and number of rebates; count frames for dowelling.

23. Doors, gates, &c., net size in super feet, allowing for rebate in folding doors, keeping each description separate, and state if flush-beaded at meeting edges, or for double margins, &c.; hanging to be counted and described, locks and other fittings at a price each and labour fixing; bolts to dimensions, and ditto. [NOTE: Hanging is usually included with the door in London practice.]

24. Architraves in lineal feet net measure, and state if with grounds, and, except for single moulds up to 3 inch, count all mitres, or special adaptations; blocks to be counted in pairs, including all labour fitting architraves thereto. [NOTE: In London practice the grounds are frequently measured separately.]

25. Window sashes and frames to be measured full size of frames; if not square headed, state so, or else count the heads for extra price, with description; state if extra strength be required in any part of frame, or any particular way of working weatherings, sinkings, &c.

26. Casement sheets and frames to be measured separately and as above, with scantlings.

27. State if holdfasts or other particular mode of fixing frames be required.

28. Skylights to be measured full size. Any portion of a sheet made to open, to be measured again in addition, if it is a separate piece of framing, and any grooving, weather fillets, &c., accounted for.

29. Window backs and elbows, and soffits, and linings, worked one side only, to be kept separate from shutters, and state if to have grounds; if linings are under 9 inches wide, take lineal, with the width. Plinths and capping and flush beads to be measured lineal. Hanging sheets and casements to be counted, with particulars of pulleys, cords, weights, hinges, fastenings, &c. Hanging shutters and backlaps ditto. Window bottoms lineal, and count returned ends.

30. Bracketing for cornices in lineal feet, with girth or sketch of brackets, and distances apart.

31. Coves, super feet, for stuff and work.

32. Cradling round beams, super, for stuff and work.

33. Bridging for floors in lineal feet, and state whether slab or herring bone bridging, also whether tie rod or hoop iron is to be used.

34. Wall boarding and dados in super feet, and give lineal feet of grounds, and also fitting to architraves, &c.

35. All casings to underside beams, gutters, cisterns, &c., in super feet, with description, or else lineal, with girth and number of beads.

36. Pipe casing, ditto, and state if to be fitted with screws for taking down at pleasure.

37. The different items of water-closets to be kept separate, and state if fitted with screws, &c., to take down; seat and bearers, fall and frame, riser, all super; skirting, super or lineal according to requirements; capping separate. Holes cutting, falls hanging, hinges, paper boxes, &c., and attendance on plumber, to be counted.

38. For bath framing take riser and skirting as for water-closets; bearers for curb lineal; curb lineal, with average width, or super.

39. French-polishing to be where practicable measured separately in superficial feet.

40. Fixtures require careful measurement in detail; skeleton fronts for drawers and small cupboard fronts separate from the fronts themselves; bearers, false bottoms, drawers fitting with stops, hanging doors, knobs, and other fastenings, divisions,

guides, &c., all to be taken into account; shelves with widths and bearers or brackets, also hook rails all lineal. [NOTE: Generally measured per foot superficial in London practice.]

41. Stairs in ordinary cases to be counted, with dimensions, and state whether returned nosings and cut string boards, notch boards, and number of carriages; measure hand rail, and balusters, and newels separate; and casing and nosing, hand rails and balusters along landings; count ramps, scrolls, curtail ends, and circular corners to wells; give spandrel framing separate from square framed work; state french-polishing; landings to be taken super in feet including bearers, and nosings, &c., at the edge, to be taken lineal.

42. All other items of ironmongery to be counted, with particulars, or price and labour fixing in addition.

43. All circular work throughout to be kept separate from straight work.

44. Enter up reserved amounts, provisions of materials or cash, &c., and clearly state if such are to include Contractor's profit or to be deducted in full.

45. The Carpenter generally undertakes the fixing of the ironwork, and in many instances it might be desirable to put the fixing and staying during erection in his quantities, giving the weight of cast and wrought iron beams, &c., and counting the bolts, rods, &c.

46. Insurance if to be provided for by the Carpenter to be entered.

PLASTERER AND PAINTER

1. State description of materials, and keep the work of each kind separate.

2. Plastering on walls to be measured from the floor upwards, or from the point where each description of work commences.

3. Where cornices are lathed on brackets, measure ceiling and walls to the edge of the brackets only.

4. Where cornices are not bracketed, measure the ceiling

full size of room, and the walls up to ceiling; all in super yards.

5. Deduct all openings 100 square feet and over; deduct materials and add labour (hollows) for net sizes of doors, windows, fire-places, and other openings under 100 feet super. [NOTE: All openings deducted in London practice.]

6. Where ceilings are panelled and coffered, or coved, girth round all portions that are lathed, keeping circular work separate.

7. Ceilings plastered between spars, &c., to be measured across the spars and purlins, and even then kept separate, and described as such.

8. All work run with a mould to be measured lineal on the wall and the girth given, as cornices, rustics, strings, architraves, soffits, quirks, &c.; count all mitres, with the girth of mould they belong to; count mitres in panelled work.

9. All cornices, &c., lathed on brackets to be kept separate, and described as such.

10. All cast work to be counted, except running enrichments.

11. Enriched members to be measured lineal, with girth.

12. Modelling of enrichments to be, if special, so stated, and the models to be the property of the Architect.

13. Ceilings or walls covered with panels, formed by small moulds, to be measured super, with illustration or drawing, for "extra price over plain work"; larger panelling or special decorative features to be measured in detail.

14. Angles to pilasters, &c., if specially formed in cement or otherwise, to be so measured, lineal and extra to plastering.

15. Door and window frames, bedding and pointing, to be counted, and state material to be used; also flushing to inside of frames after fixing, or behind casings, window backs, or other work to be given.

16. Making good generally, and after plumber, gasfitter, bellhanger, &c., and chimney-pieces, as an item, stating numbers.

17. Colouring and whitewashing walls, &c., to be in super yards, measuring over all openings under 100 super feet; if

the work has to be pointed by the plasterer, state so. [NOTE: Openings deducted in London practice.]

18. Painting to include stopping and knotting, and to be given in square yards. Priming to be separate, if on work painted before being fixed. Painting to be girthed round all exposed surfaces, except as below.

19. Balusters, if ordinary square, and grids, gates, and other metal work painted on both sides, with bars about 5 in. to 6 in. apart, to be measured one surface only; if closer or slightly ornamental, $1\frac{1}{2}$ surfaces; and for very close or very ornamental work, 2 to $2\frac{1}{2}$ surfaces. [NOTE: Where measured in London practice actual surface is taken.]

20. Windows to be measured each surface over full size of opening for painting frame and sheets, or else the frames counted, and the sheets, if large squares, counted; but if in small squares, as old-fashioned crown glazing, then count the squares instead of the sheets. [NOTE: Both are usually counted in London practice.]

21. Fancy or ornamental painting to be measured in detail, with lengths of mouldings picked out, gilt, &c. All work in parti-colours to be kept separate from plain work.

PLUMBER AND GLAZIER.

1. The lead to be reduced to weight, and the different kinds of work kept separate, as gutters, flashings, valleys, and ridges, and flats; the work requiring solder, as cisterns and cesspools, dressing over finials, and other fancy work; allow proper lap, as specified, to flashings, drips, and rolls; the net quantity of lead, as fixed, only to be measured.

2. All water, supply, service, waste, or other pipes to be given in lineal feet, with the weight per foot or thickness; the dimensions stated to mean *in all cases, whether specified or not, the clear internal bore.* The price to include all soldering and forming joints, wall hooks and fixing.

3. No allowance to be measured for sockets and joints in

iron piping, down spouts, &c., but state whether flanges or holdfasts are to be included.

4. If pipes are to be laid in trenches in the ground, state so, and how, and whether plumber is to do the excavator's work.

5. Count all traps, and also all bends and shoes to down-spouts of soil pipes, spitters from cesspools to spouts, rain-water heads, taps, plugs, overflows, wastes with plug and washer, water-closet and bath fittings (the pipes thereto and therefrom measured with the other piping), wash basins, urinals, hot-water cisterns, and other special fittings, and in all such instances to give a clear, unmistakable description of what is required, or the price, exclusive of fixing.

6. Iron gutters and down-pipes to be measured in lineal yards; no allowance for joints, but elbows, stopped ends, &c., to be counted and described.

7. The different descriptions of glass, with thickness or weight per foot, to be given in superficial feet, assorting each into different average sizes, and keeping bent sheets separate. Curved or other special edges, to be measured lineal, the glass being first measured the size such special shape has to be cut from. Special descriptions of work, such as lead lights, &c., to be described.

8. Pointing to flashings to be measured lineal and described.

9. Making good and leaving all perfect at conclusion of works, as an item.

IRONFOUNDER.

1. The most suitable method is to reduce each description of work to weight, keeping columns separate from beams, small castings from large, and intricate ones, as railing, grids, &c., separate from plain ones; the cost to include pattern making; any fancy work to be specially mentioned; and the castings from each such pattern kept separate from others; the metal to be taken at 40 lbs. per foot super, 1 in. thick.

2. State whether price to include fixing. (*Vide* No. 45 in Carpenter.)

3. Special labour, as turning columns, coupling boxes, &c., to be given in detail.

4. State whether beams are to be tested, and if at Contractor's expense and risk.

5. Bolts and other small fittings to be counted and described, with the labour necessary in preparing for and fixing them.

6. State whether lead or other material is to be found for running lugs, &c., and indicate the number of them.

7. Long bolts, tie rods, &c., to be measured lineal, with allowance for head and nut, and count the number of nuts, and screwing, and washers.

8. Swing sheets, gates, &c., and their fittings, hangings, and fastenings to be fully described and counted, both for materials and labour.

9. In measuring wrought-iron beams and frame-work, ascertain the weight of metal in plates and other shapes, adding the rivets and bolts, with the labour separate on any particular forgings or cuttings.

10. All wrought-iron rolled or built girders to be fully described and given in lineal lengths, with section.

11. If painted before fixing, to be measured in full.

SLATER AND TILER.

1. State size and description of slates or tiles, nails, and battens, and whether and how pointed underneath, and amount of lap.

2. The usage varying with respect to allowances at eaves for double course, and hips and valleys for waste, the Manchester Society of Architects purposes to measure slating net as finished, and to give the length of eaves for extra price of double course, and the length of each bevelled edge at hips and valleys, &c., for "single bevel cutting waste," and also the bevel cutting where so done to land-gutters, &c. All openings of 100 feet to be deducted entirely, and any others, but allowing for labour as "hollows" below that amount down to 6 feet super, below which no deductions to be made. Any special

cutting, as close hips, &c., to be separately mentioned and described. [NOTE: Labour to hollows not known in London practice, see pages 32 and 37 for allowances in this trade.]

3. In tile roofs, hips and valleys to be measured lineal, and fitting included.

4. Ridge tiling to be fully described and given in lineal yards, and state how to be bedded and pointed.

5. Pointing to overhanging eaves or gables, in lineal feet.

6. Sweeping and cleaning out gutters, leaving all clean and perfect.

7. Circular slating, fancy courses, slating to spires, or other special work, to be kept separate, and fully described.

SUNDRIES.

Floor or wall tiling, paperhanging, cooking and heating apparatus, bellhanging and gasfitting, are generally matters of separate arrangement with the tradesmen. If requisite to include the two latter, bellhanging may be given at so many bells with 1 pull, and so many with 2, the furniture being described and counted; gasfitting at so much per position, exclusive of meter, for piping and brass bits, or else measured in detail as for water piping.

CHAPTER XX

EXAMPLES OF GROUPING

AS previously mentioned the system of "grouping" items in the various trades together is in certain cases very convenient. Some take the carcase and the finishings separately. The practice is recommended (after one has obtained efficiency in taking-off by trades) of measuring over all and taking the whole of the trades for voids (such as windows and doors) together, the deductions being taken at the same time.

The following examples are given of :—

(*a*) Window
(*b*) Door
(*c*) Floor
(*d*) Fireplace
(*e*) Flat
(*f*) Gutter

It is hoped that these examples will be sufficiently explicit; the necessity is emphasised of carefully studying the work to be measured before making up one's mind as to which is the best system to pursue. When this is decided upon every effort must be made to adhere rigidly to such system.

EXAMPLE OF WINDOW.

Deal cased frames, $2\frac{1}{2}'' \times 6''$, with oak sunk weathered, throated and grooved cills, including $1'' \times \frac{1}{8}''$ galvanised iron water bar bedded in red lead with $1\frac{1}{4}''$ outside, $\frac{3}{4}''$ inside, and $\frac{1}{2}''$ back linings, with $1\frac{1}{4}''$ pulley stiles, and $\frac{3}{8}''$ parting beads, $\frac{5}{8}'' \times 1''$ sash bead, with $3''$ beaded ventilating piece to cills, $\frac{1}{4}''$ parting slips and $1\frac{3}{4}''$ (finished) deal moulded sashes with moulded horns, $1\frac{1}{4}''$ moulded and double rebated sash bars dividing each sash into 6 lights with steel ribbon lines and brass axle pulleys with lead weights; fitted with $1\frac{1}{2}''$ deal

wrot, rebated, splayed, beaded and panelled shutters moulded one side and bead flush the other, in two panels, all to detail, hung folding with $1\frac{1}{4}''$ moulded and panelled linings and $1\frac{1}{4}''$ rebated, panelled, and moulded soffit and window back; the whole to be put together in the best manner and in accordance with the details provided.

Fig. 57.

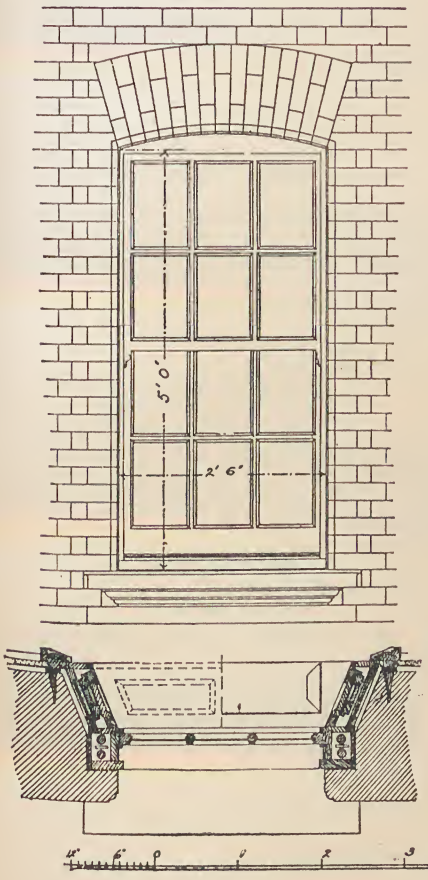


Fig. 58.

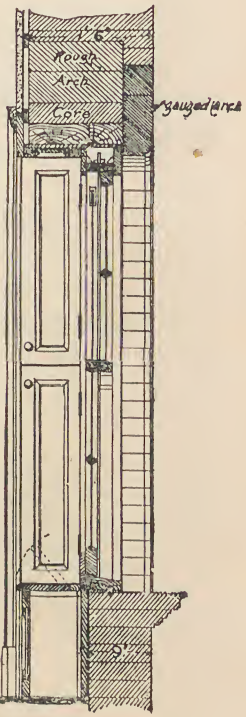


Fig. 59.

INTERNALLY.

	Opening 2′ 6″ × 5′ 0″		
			2′ 6″ 2/ 4½″ reveals 9″ 3′ 3″
			5′ 0″ head 3″ 5′ 3″
	3′ 3″ 5′ 3″	17′ 1″	Deal cased frame &c. as described.
	3′ 5′ 2′ 3″	3′ 3″	⅛″ × 1″ Galvanized iron water bar and bedding in red lead.
	4′ 6″	10′ 2″	26 oz. glass in squares under 2 feet super
		No. 1.	Patent sash fastener p.c. 2*s.*
		No. 1.	Pair sash lifts p.c. 1*s.* 6*d.*
		No. 1	Bed and point frame
		No. 12	Breeze bricks and fixing
	3′ 3″ 5′ 3″	17′ 1″	Ddt. ½ Bk.
			3′ 3″ 2/ 9″ bearings at ends 1′ 6″ 4′ 9″
	4′ 9″ 6″ 3″	·7	Fir in lintol
		No. 1	Extra only on stock brickwork for rough relieving arch in two ½ B. rings and 4½″ soffit over 4′ 9″ span. Width of window 2′ 6″ Add 1″ for each rebate 3″ 2′ 9″
	2′ 9″ 5′ 1′	14′ 0″	1½″ Deal, wrot, rebated, splayed, beaded and panelled shutters moulded one side and bead flush the other in 2 panels each to detail hung folding
2/	4	No. 8	Pairs of 3″ brass butts
		No. 2	Shutter knobs

INTERNALLY.

		No. 1	Approved shutter bar
2/	10″ 5′ 3″		
		8′ 9″	1¼″ moulded and square panelled splayed lining (to back of shutter boxes) rebated all round including backings and grounds 2′ 6″ 2/ 8″ 1′ 4″ 3′ 10″
	3′ 10″ 9″	2′ 11″	1¼″ deal wrot and rebated moulded and panelled soffit to window 4/ 5′ 3″ 21′ 0″ 4/ 10″ 3′ 4″ 24′ 4″
	24′ 4″	24′ 4″	Groove in deal (to take rebates of inner linings)
	3′ 3″ 1′ 4″	4′ 4″	1¼″ panelled and moulded window back rebated to floor
	3′ 3″	3′ 3″	Groove in deal
	3′ 10″ 9″	2′ 11″	Deal wrot and beaded frame and mitre clamped flap and frame rebated to oak cill and grooved to top of window back as seat cut to shape and rounded on front edge, including bearers
		No. 1	Pair 3″ brass butts (for do.)
	3′ 3″	3′ 3″	Groove in oak
	3′ 10′	3′ 10″	Do. in deal 10″ 10″ 3′ 4″ 5′ 0″
	5′ 0″ 1′ 4″	6′ 8″	1″ deal wrot match boarded lining, rebated on two edges and plugged to wall (as lining to 9″ wall)

INTERNALLY.

	3′ 3″	3′ 3″	Groove in oak
	3′ 0″	3′ 0″	Do. in deal
	3′ 3″ 6′ 3″	20′ 4″	Ddt. 1 B.
			Extreme width of opening say . 4′ 0″ Two 9″ bearings . . . . 1′ 6″ 5′ 6″ 9″ 5′ 6″
	3″	1′ 0″	Fir lintol
2/6	8″ 11″	12′ 3″	Rough splayed cutting on brickwork
		No. 1	E.O. on stock brickwork for rough relieving arch and in two ½ B. rings, 1 B. soffit 5′ 6″ span
	4′ 0″ 9″	3′ 0″	1″ floor and bearers in small quantities in opening
	4′ 6″ 6′ 6″	29′ 3″	Ddt. L.P.F. and S.
	4′ 6″ 6″	2′ 3″	Ddt. battening to walls Ddt. render and float only (at back of skirting)
	4′ 6″ 6′ 6″	29′ 3″	Ddt. paper to walls
	4′ 8″	4′ 8″	Ddt. 1″ × 7″ skirting 7′ 2″ 7′ 2″ 4′ 8″ 19′ 0″
	19′ 0″ 10″	16′ 0″	1″ wrot splayed, beaded and framed grounds
	19′ 4″	19′ 4″	1½″ and 4″ moulded and mitred architrave including grounds
		No. 2	E.O. to plinth blocks 7″ high

2/	2	No. 4	Ends of grounds and architraves housed to plinth blocks
2/	1	No. 2	Do. 7″ skirting housed to do.

EXTERNALLY

	2′ 6″ 5′ 0″	12′ 6″	Ddt. ½ B. and Ddt. facings
2/	4½″ 5′ 0″	3′ 9″	Add facings (reveals) 2′ 7″ Intrados 3′ 3″ Extrados 2) 5′ 10″ 2′ 11″
	2′ 11″ 1′ 2″	3′ 5″	Ddt. facings (to arch)
	2′ 11″ 1′ 2″	3′ 5′	Rubbed and gauged arch.
	2′ 7″ 4½″	1′ 0″	Add do. (soffit)
	2′ 6″	2′ 6″	Cambered turning piece to 4½ soffit.
			Skewback 1′ 2″ „ 1′ 2″ Ext. 3′ 3″ 5′ 7″
	5′ 7″	5′ 7″	Circular and skewback cutting to facings
2/	5′ 6″	11′ 0″	Labour cut and rubbed moulding on brick work 2¾″ girth on face only
	3′ 0″	3′ 0″	Do. do. to circular arch

	No. 2	Irregular mitres
3′ 2″ 6″	1′ 7″	½ B. (oversail to cill)
3′ 0″ 6″	1′ 6″	Ddt. facings
		3′ 4″ 4½″ 4½″ 4′ 1″
4′ 1″	4′ 1″	Extra over stock brickwork for 2 courses of moulded bricks laid oversailing
2	No. 2	External mitres
3′ 4″ 9″	2′ 6″	Portland cement weathering (to top of cill)
3′ 3″	3′ 3″	Groove in brickwork (for water bar)

FOUR PANEL EXTERNAL DOOR (See page 209).

2′ 6″ 6′ 6″	16′ 3″	2″ deal 4 panelled moulded both sides door to detail
1	No. 1	Pair 4″ butts
1	No. 1	6″ mortice lock and furniture
1	No. 1	Provide the sum of for finger plate, lever and handle, and wrot iron combined knocker
1	No. 1	15″ brass barrel bolt
1	No. 1	10″ ditto

FIG. 60.

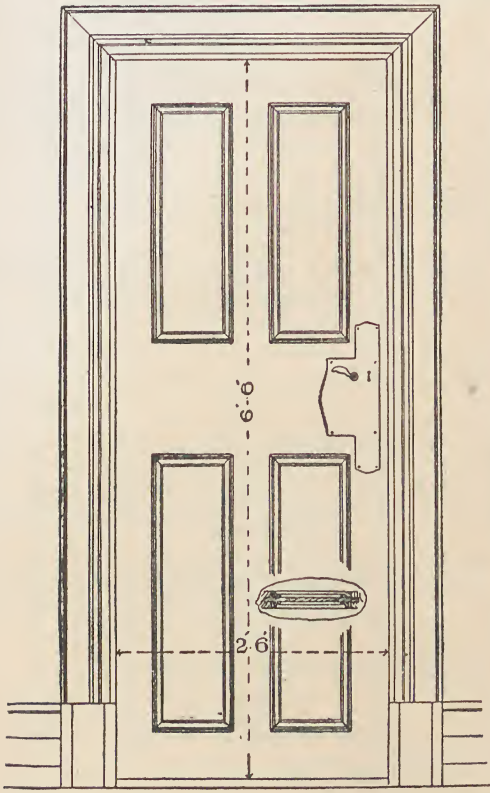
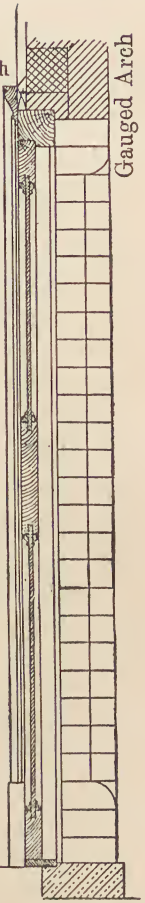


FIG. 61.



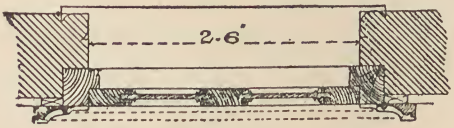
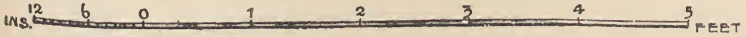


FIG. 62.



		Height of door one side 6′ 6″ Height of door other side 6′ 6″ 2 tenons . . . 8″ 2 stubs . . . . 4″ Width of door . . 2′ 6″ 2ce thickness of frame . 8″ Extra width of horns . 6″ 17′ 8″
17′ 8″	17′ 8″	4″ × 4″ wrot rebated and twice beaded door frame
1	No. 1	Bed and point frame
2/4	No. 8	Fixing fillets 9″ × 4½″ × ⅜″ including building into joints of brickwork 6′ 6″ 6′ 6″ 2′ 6″ 4/ 6″ 2′ 0″ 17′ 6″
17′ 6″	17′ 6″	1½″ × 4½″ moulded and mitred architrave, including narrow splayed grounds plugged to walls
2	No. 2	Extra only on ditto to moulded plinth blocks 9″ high, including housing ends of architraves
3′ 4″ 6′ 3″	20′ 10″	Ddt. R. F. & S. to walls and Ddt. distempering to walls
3′ 4″ 8″	2′ 3″	Ddt. render and float (back of skirting)
2′ 6″	2′ 6″	1¼″ × 4″ wrot oak cill and fixing Width of door 2′ 6″ Door frames 2/ 2½″ ·5″ Bearing 2/ 9″ 1′· ·6″ 4·′ 5″

	4′ 5″ 4½ 3	5″	Fir in lintol
		No. 1	Extra only on stock brickwork to rough relieving arch in two ½ B. rings 4½″ soffit, 4′ 5″ span
	2′ 6″ 6′ 9′	16′ 10″	Ddt. 1 B. (opening)
	2′ 9″ 9″	2′ 1″	Extra only on stock brickwork to fair axed arch in picked stock facings
	2′ 6″ 6″	1′ 3″	Add do. (soffite)
	2′ 9″ 9″	2′ 1″	Ddt. facings
	2″ 6″	2′ 6″	Cambered turning piece to 6″ soffit
	3′ 0″	3′ 0″	Circular cutting to facings
2/	9″	1′ 6″	Faircutting to facings (skewbacks)
2/	6′ 0″	12′ 0″	Extra only on facings to staff beaded brick quoins
2	2	4	Stopped ends
	2′ 6″ 6′ 9″	16′ 10″	Ddt. facings
2/	6″ 6′ 9″	6′ 9″	Add facing (reveals)
	3′ 0″		4″ × 9″ rubbed top and front edge and back jointed York cill
	2′ 6″		Stopped rebate in do. 3″ girt, including stopped ends
	2	No. 2	Fair rubbed ends
	2	No. 2	Ends of 4″ × 9″, cill make good to facings

SINGLE FLOOR AND HEARTH.

Fig. 63.

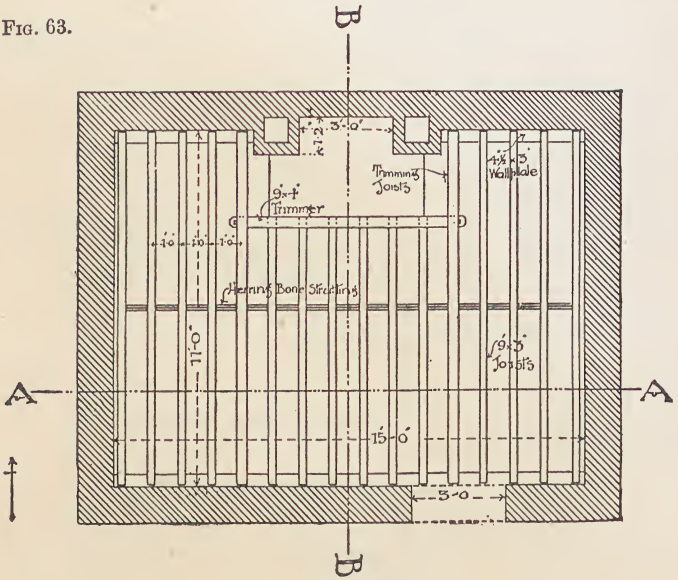


Fig. 64.

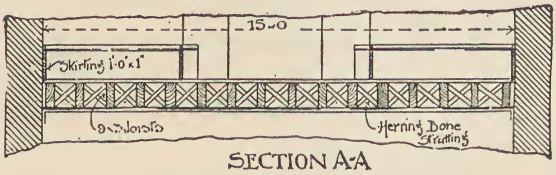
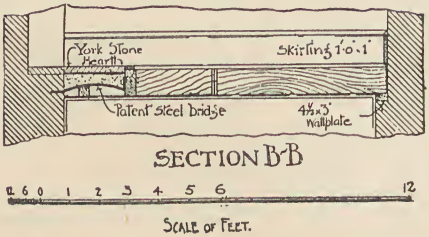


Fig. 65.



SINGLE FLOOR AND HEARTH :—

15′ 0″ 11′ 0″	165′ 0″	$1\frac{1}{4}$″ best yellow deal floor in batten widths with splayed heading joints
6′ 0″ 9″	4′ 6″	Ddt. (chimney breast)
5′ 0″ 2′ 0″	10′ 0′	Ddt. (hearth)
		2′ 0″ 5′ 0″ 2′ 0″ 4/ $2\frac{1}{2}$″ = ·10″ 9′ 10″
9′ 10″	9′ 10″	$2\frac{1}{2}$″ deal mitred margin in $1\frac{1}{4}$″ floor round hearth
3′ 0″ 1′ 2″	3′ 6″	$1\frac{1}{4}$″ floor in doorway in small quantities and bearers
		East wall . . . 11′ 0″ North ,, 2/ 4′ 6″ = 9′ 0″ 2/ 9″ = 1′ 6″ } round chimney breast 2/ 6″ = 1′ 0″ } External angles 2/ 2″ = ·4″ West wall . . . 11′ 0″ South ,, . . . 15′ 0″ 48′ 10″
48′ 10″	48′ 10″	1″ × 12″ Moulded skirting including backings and grounds rebated to floor, including groove for same
3′ 0″	3′ 0″	Ddt. skirting (door)
	No. 6	Internal mitres to do.
	No. 2	External mitres to do.
	No. 2	Housings of skirting to architrave
	No. 2	Fitted ends (to chimney-piece)

			Wall plate 15′ 0″ 4′ 6″ 4′ 6″ 24′ 0″
	24′ 0″ 4½″ 3″	2′ 3″	Fir in plate including bedding
14/	11′ 0″ 3″ 9″	38′ 6″	Fir framed in joists
2/	11′ 0″ 4″ 9″	5′ 6″	Add (for fir in trimming joists)
	6′ 6″ 3″ 4″	6½″	Add (for lathing to under steel bridge)
	7′ 6″ 4″ 9″	1′ 10″	Add (trimmer)
6/	2′ 8″ 3″ 9″	3′ 0″	Ddt. fir framed in joists (hearth)
	15′ 0″	15′ 0″	2″ × 2″ herring-bone strutting to 9″ joists
	5′ 0″ 2′ 0″	10′ 0″	2½″ rubbed York hearth and setting
	3′ 0″ 1′ 2″	3′ 6″	3″ tooled York back hearth and ditto
		No. 1	Steel bridge (Moore's patent) supporting hearth (5′ 0″ × 2′ 3″) including bolts and fixing, and levelling up with concrete to receive hearth

FIG. 66.

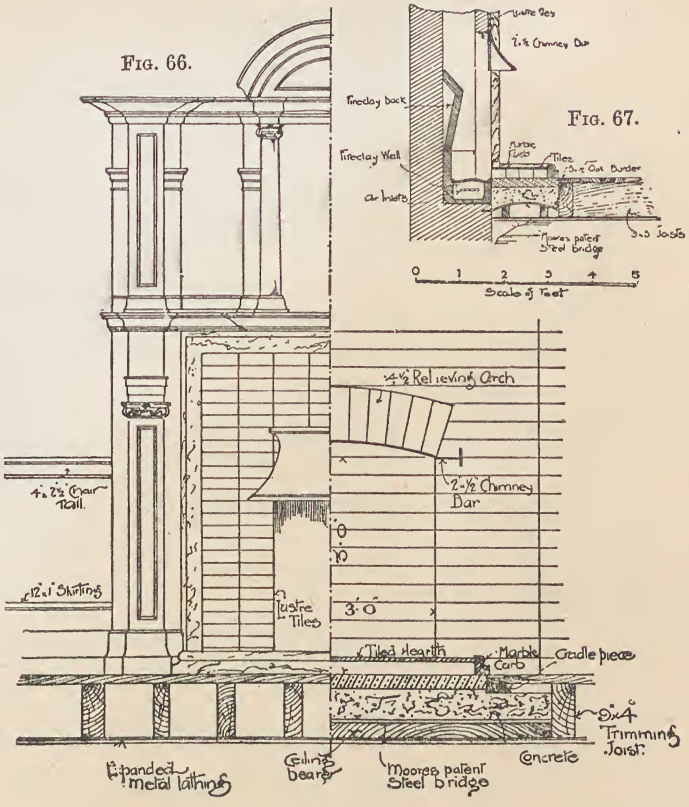


FIG. 67.

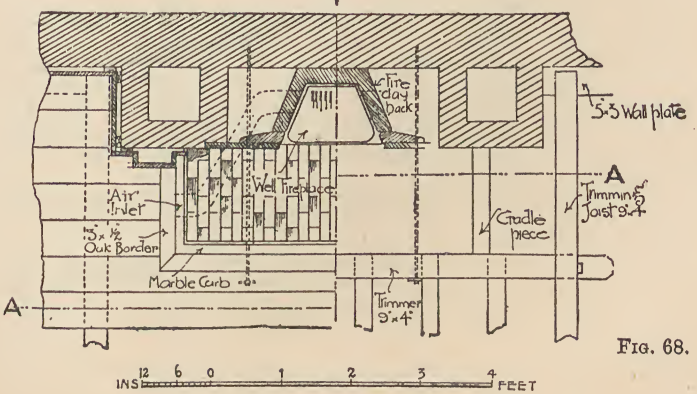


FIG. 68.

FIREPLACE :—

3′ 0″ 3′ 0″	9′ 0″	Ddt. 1½ B. (fireplace opening)
1	No. 1	E. O. on stock brickwork to 9″ rough relieving arch 4½″ soffit to 3′ 0″ opening Opening 3′ 0″ Camber 1″ Bearing 2/ 4½″ 9″ Turn up and down 2/2″ 4″ 4′ 2″
4′ 2″	4′ 2″	2″ × ½″ cambered chimney bar, split turned up and down 2″ at each end
1	No. 1	Render back of fireplace in mortar
1	No. 1	Parge and core flue
1	No. 1	Doulton's terra cotta chimney-pot (fig. 40) 2′ 6″ high, including setting and flaunching in cement
		Provide a P. C. sum of £7 10*s.* 0*d.* for a "Well" fireplace (Bowe's patent)
		Allow for all materials and labour for setting same
		Provide a P. C. sum of £5 for marble curb and allow for setting same
		Provide a P. C. sum of £2 5*s.* 0*d.* for tile hearth as selected, and allow for laying same, including concrete bed and cement screeding
		Provide the P. C. sum of £2 10*s.* 0*d.* for tiles in panels, and allow for setting same
		Provide the P. C. sum of £14 for oak overmantel with marble slips, and allow for fixing same

LEAD FLAT.

FIG. 69.

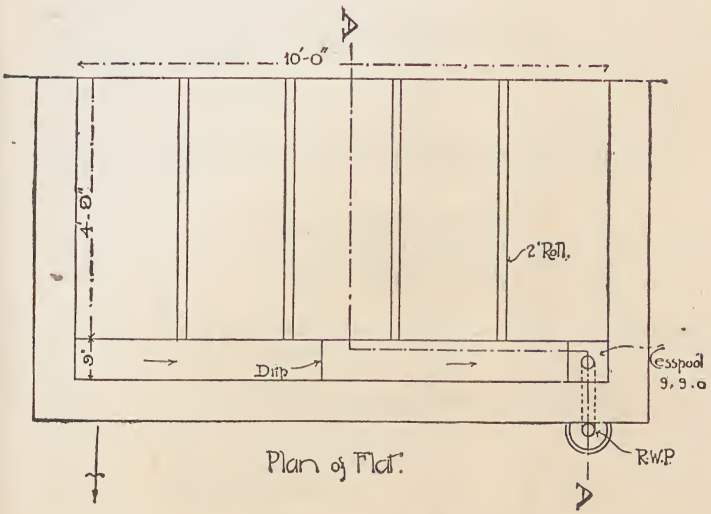
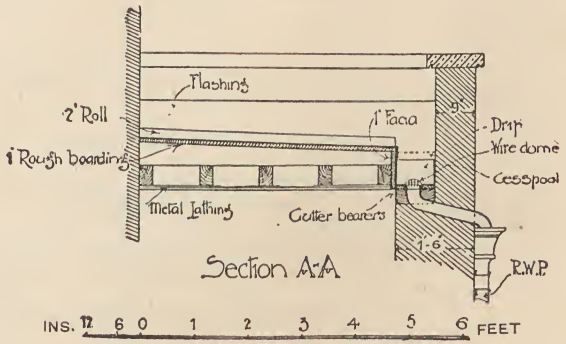


FIG. 70.



			10′ 0″ 2/ 6″ 1′ 0″ (Turn ups) 4/ 9″ 3′ 0″ (Rolls) 14′ 0″
			4′ 9″ 2/ 6″ 1′ 0″ Turn up and down 5′ 9″
	14′ 0″ 5′ 9″	80′ 6″	6 lb. milled lead laid in flats and gutters
		No. 4	Bossed ends to rolls
		No. 4	Saddles to do
			10′ 0″ 2/ 6″ Turn up against wall 1′ 0″ 2/ 6″ Drips . . . 1′ 0″ 12′ 0″
			Sole . . . . . 9″ Turn up against wall . . 6″ Turn up against roof . . 8″ 1′ 11″
	12′ 0″ 1′ 11″	23′ 0″	Add 6 lb. lead as before
4/	9″ 6″	1′ 6″	Add (extra lead for sides of cesspool)
		No. 1	Labour and solder to cesspool
		No. 1	$1\frac{1}{4}$″ deal dovetailed cesspool 9″ × 9″ × 6″ all in clear holed and fitted
		No. 1	24″ length of 3″ double bent drawn lead pipe including wiped joint to cesspool
		No. 1	Stout copper wire domed head to same
		No. 1	Perforation in 2 B. wall for 3″ pipe and making good

			East wall . . . . . 5′ 6″ South wall . . . . . 10′ 0″ West wall . . . . . 5′ 6″ North wall . . . . 10′ 0″
			4 laps at angle at 6″ each . . 2′ 0″ 2 laps in lengths over 7′ at 4″ each 8″ Allow 4″ in every 7′ for tacks, &c. 1′ 8″ 35′ 4″
	35′ 4″ 6″	17′ 8″	5 lb. milled lead in cover flashings
	31′ 0″	31′ 0″	Rake out wedge and point to over flashings
	10′ 0″ 4′ 9″	47′ 6″	1″ rough boarding to flat with edges shot
	10′ 0″	10′ 0″	Labour to forming rebated drip
4/	4′ 9″	19′ 0″	2″ deal rounded rolls
6/	4′ 9″ 4″ 3″	2′ 4½″	Rough firring to flat
			2 drips 10′ 0″ 2″ 10′ 2″
	10′ 2″ 9″	7′ 8″	1″ gutter boards and bearers
	2	No. 2	Cross rebated drips
	10′ 0″ 6″	5′ 0″	1″ boarding as fascia
6/	10′ 0″ 4½″ 3″	5′ 7½″	Fir framed in roof

2/	5′ 6 4½ 3″	1′ 11″	Fir in wall plates
	10′ 0″ 4′ 9″	47′ 6″	Expanded metal lathing and fixing to ceiling and plaster float and set to ditto

LEAD GUTTERS (see page 221).

LENGTH OF GUTTERS.

South gutter . . . 51′ 6″
Ddt. width of
West gutter 1′ 9″
Do. of cesspool 1′ 0″
2′ 9″
48′ 9″

West gutter 30′ 0″
Ddt. width of
cesspool 1′ 0″
29′ 0″
77′ 9″

Extra for 8 drips
8/1″ 8″
78′ 5″

WIDTH OF GUTTERS.

West gutter { 1′ 9″ / 1′ 6″ / 1′ 3″

South gutter { 1′ 9″ / 1′ 9″ / 1′ 6″ / 1′ 3″ / 1′ 0″

8)11′ 9″

Average say 1′ 6″

78′ 5″ 1′ 6″	117′ 8″	1″ deal gutter boards and framed bearers

LEAD GUTTER.

FIG. 71.

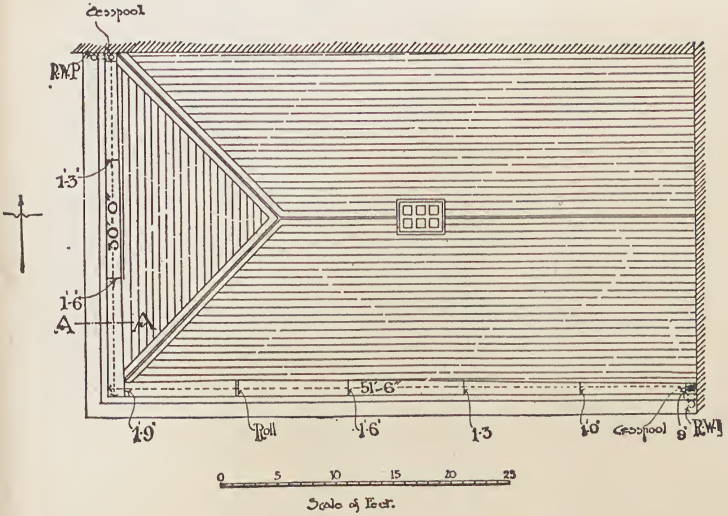
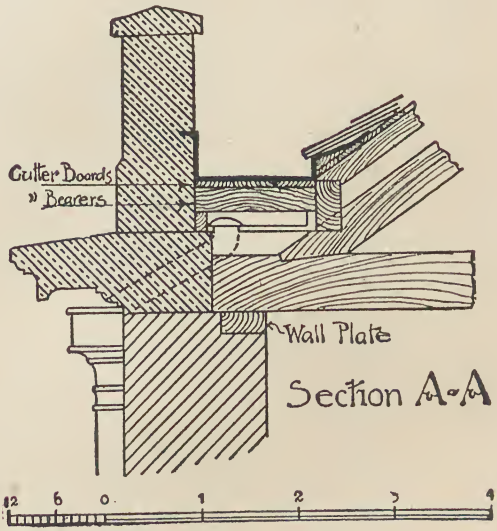


FIG. 72.



	1	No. 1	Short length of 2″ deal rounded roll
	8	No. 8	Short lengths of $1\frac{1}{2}$″ cross rebated drips
2/	1	No. 2	$1\frac{1}{4}$″ deal dovetailed cesspools 1′ 0″ × 1′ 0″ × 6″ in the clear including fitting
			Length of South gutter 48′ 9″ Do. West do. 29′ 0″ 8 drips at 6″ . 4′ 0″ 1 roll . . 9″ 82′ 6″
			Av. sole of gutter 1′ 6″ Turn up on roof 9″ Do. against wall 6″ 2′ 9″
	82′ 6″ 2′ 9″	226′10″	6 lb. milled lead in gutters
			3″ 6″ 1′ 0″ 6″ 3″ 2′ 6″
2/	2′ 6″ 2′ 6″	12′ 6″	Add (for cesspools)
	2	No. 2	Bossed saddles to roll 51′ 6″ 30′ 0″
			4″ for every 7 feet for tacks &c. 4′ 0″ 3 angles . . . . 1′ 6″ 87′ 0″
	87′ 0″ 9″	65′ 3″	5 lb. lead in cover flashings
	81′ 6′	81′ 6″	Burning in lead flashing to stonework and groove in stone

		No. 2	Extra labour and solder to cesspools
2/	1	No. 2	1′ 6″ lengths of 4″ once bent drawn lead pipe out of 7 lb. lead including tafting and soldering to cesspools
2/	1	No. 2	Stout copper wire dome heads to cesspools
2/	1	No. 2	Perforations in stone cornice for 4″ pipe and making good
			81′ 6″ 3′ 6″ 78′ 0″
	78′ 0″	78′ 0″	1″ × 4′ tilting fillet fixed to common rafter

CHAPTER XXI

THE LAW

Contract.—When the quantities are prepared either for the new building or the reparation of an old one, it is usual to prepare the contract in writing. This is undoubtedly the wisest and most usual course, but the law says that contracts for building or repairing houses, or for doing any works upon lands, if they may be performed within a year from the making thereof, need not be in writing.

Architect must have unbiassed mind.—It would appear that in some cases the architect would do wisely not to act as quantity surveyor in measuring extras and omissions at the conclusion of contract. For instance, when he has to determine the amount due to the builder and has assured the employer that the cost *shall not exceed a certain sum*, he does not then in the eye of the law possess the unbiassed mind which will enable his decision to be just and conclusive, and the builder may bring a claim for the sum over and above that allowed by the architect. It appears from this that it would be imprudent on the part of an architect to take upon himself the function of determining the final amount due to the builder, in such cases where he has given such an assurance to his client, as he may be leading the latter into a position which he ought not to occupy, and that his better course would be, as agent to his client, to put the winding up of the account in the hands of an independent surveyor. The cases which bear this out are *Kemp* v. *Rose*, 27 L.J., Ch. 264 ; and *Kimberley* v. *Dick*, L.R., 13 Eq. 1. The legal definition is very clear—

"In treating of the contract to perform works, the method proposed is to state the general duties of each party separately. In such a contract one party, termed the contractor, agrees to perform certain works ; and the other, termed the employer, agrees to pay a certain reward. The

duties of the contractor are, first, to finish the work; secondly, to use care and skill in the performance; thirdly, to do it within a proper time; fourthly, to comply with the particular stipulations in the contract as to manner of performance. The duties of the employer are, first, to pay; secondly, not to prevent but to assist the contractor in his execution of the contract.

"The first duty of a contractor is to complete his contract, that is, to finish all the work he has agreed to do. If he contracts to do a specific work for a specific sum, he must perform the whole of the work before he is entitled to receive payment of any part of the price; so long as the work is unfinished, he is entitled to nothing."

Of course, the condition usually put in the contract that instalments shall be paid, varying from 70 to 80 per cent., qualifies the last legal maxim as to his not being entitled to anything until the building is fully completed.

But to show that a contractor must perform most fully what he undertakes, the following case is cited :—

"So, where the contract was to build a mill for a specific sum, and if it did not answer, to build another, the court decided that the plaintiff could recover nothing for building the mill, unless he either proved that it had answered or had been accepted by the defendant."

Another curious case is given—

"And when the action was on a contract to build a house for a certain sum, which the plaintiff did not complete because the defendant had refused to supply him with money as he went on, Coleridge, J., ruled that 'he was not entitled to receive anything under the contract till he had finished the house'; and he failed to recover anything for the work done under the contract, although he recovered for extra work."

These last cases may not seem to affect surveyors who take out quantities; but to make this work more useful cases are given that affect both the taking out of the quantities and the carrying out the building.

By permission of the late Mr. Arthur Cates, we are enabled to include what he describes as

THE SURVEYOR'S DECALOGUE.

1. That, when tenders are required from a number of builders for the erection of a building, it is essential that bills of quantities should be prepared, in order that each of them may make his tender on identically the same basis.

2. That, in the absence of special instructions to the contrary, it is the duty of the architect to make the necessary arrangements for the providing of such bills of quantities.

3. That, for this purpose, the architect is the agent of his client, and the client is bound by his acts, whether cognizant or not of them or of the custom.

4. That, until a tender is accepted, the client is liable to the surveyor so appointed by the architect for the amount of his commission, and the expenses incurred.

5. That on the acceptance of a *bonâ-fide* tender, the liability to the surveyor shifts from the client to the builder; the surveyor accepts the builder as responsible to him, and his right of claim against the client ceases.

6. That if the work is abandoned before a tender is accepted, the client pays the surveyor; if after, the accepted builder pays, and has his remedy against the client.

7. That, as a matter of convenience, it is the custom that the architect should include, and it is an obligation on the architect so to include, in his first certificate such reasonable charges and expenses of the surveyor; but the liability of the builder is not affected by this practice, and commences immediately on the acceptance of his tender.

8. That a surveyor employed directly and solely by the builder, without the intervention or concurrence of the architect, has no claim against the client, and must look for payment to those who employed him, and on whose instructions he acted.

9. That there are circumstances under which an architect may make himself personally liable to a surveyor, but they are of infrequent occurrence, and are not likely to arise with architects of any standing or repute.

10. That the surveyor is liable to the builder for proved negligence in preparing the quantities, and it is an obligation on him to prepare his quantities with the utmost care and accuracy, that the client may not suffer by excess, or the builder by want therein; and to fulfil his important duties with the strictest honour and integrity.

The following case shows that surveyors must prove they have skill or knowledge of their profession, although the law will not allow them to be deprived of their remuneration for some small mistake:—

"In an action by an engineer for planning and making estimates for a bridge, the defence was that he did not bore or examine the soil for the foundation, and in consequence the company, for building the bridge, were put to an extra expense of £1,600. Abbott, C.J., said—'If a surveyor who makes an estimate sues his employers for the value of his services, it is a defence that he did not inform himself, by boring or otherwise, of the nature of the soil of his foundation, and it turned out to be bad, for this goes to his right of action.' On another trial on the same claim, Best, C.J., stated the law to be that "unless the negligence and want of skill was to an extent that rendered the work useless to the

defendants, they must pay him and seek their remedy in a cross action; for if it were not so,' he said, 'a man might by a small error deprive himself of his whole remuneration.' He further observed, 'that a man should not estimate a work at a price he would not contract for it; for if he did, he deceived his employer.'"

Probably no case can be quoted so indicative of what the public pay for than the case of an auctioneer, as it shows so fully that what is to be paid for is something of use to the employer.

"An auctioneer, who was employed to sell a leasehold estate, failed to recover anything for his services because he had omitted to insert a condition in the particulars of sale, that the purchaser should not inquire into the landlord's title, and in consequence his employer was unable to make out a title to the purchaser, who refused to complete the purchase. Lord Ellenborough observed—'When the plaintiff proceeds upon a *quantum meruit*, the just value of his services may be appreciated; and if they are found to be wholly abortive, he is entitled to recover no compensation.'"

Certificates.—The following will show the power of the architect or surveyor:—

"If the contract provides that the contractor shall obtain the certificate of the employer's architect before payment, he must do so. That he shall obtain such certificate is a condition precedent to his right of payment. A builder agreed to erect certain buildings under the superintendence of A. B. Clayton, or other the architect of his employer for the time being; and the contract, after providing for payment of portions of the price during the progress of the work, stipulated that the balance found due to the builder should be paid by the employer within two calendar months after receiving the said architect's certificate that the whole of the buildings and work thereby contracted for had been executed and completed to his satisfaction. It appeared that Mr. Clayton had examined and approved of the builder's charges, and had written to the employer to that effect, but had not given a certificate that he was satisfied with the manner in which the work had been done. This was held to be a condition precedent to the builder's right to recover for the work, and to apply to extra and additional works, as well as those specified in the contract."*

Architects as Arbitrators.—Next let us see what an architect may not do *without losing his position.* A curious case will illustrate this. An architect, A, entered into an undertaking with his employer, B, that a house should be erected for a sum

* *Morgan* v. *Birnie*, 9 Bing. 672 (1833).

which was not to exceed £1,500, including his own commission and all expenses, and engaged a builder to give an estimate based on the quantities he had prepared. This builder then entered into a contract with B for the completion of the work, according to A's plans and under A's superintendence, for £1,369, with power for A to order extra works, and with a clause providing that all questions between the parties under the contract should be settled by the award of A.

A DID NOT MENTION TO THE BUILDER HIS UNDERTAKING GIVEN TO B.

It was held that the architect, A, was the agent of the employer; and that his undertaking having been concealed from the builder, the arbitration clause in the contract could not be enforced; and that the plaintiff was entitled to an account for what was due to him for any works executed by him under the architect's direction, not included in the contract, and for any works so executed under the contract, the price of which was not therein included, and for any variations made under the architect's direction of works included in the contract.

So that the architect, through the concealment, was by the law dispossessed of all power, although the proviso in the contract gave him full powers.* The wording of the proviso was as follows:—

"And it is hereby further agreed that all questions between the said parties touching the matters relating to this contract, shall be left to the sole determination or award of the said architect; and the said parties hereto respectively shall and will abide by, and perform and keep, the said determination or award made in writing under his hand and seal, delivered to the said parties respectively direct. And it is hereby further agreed by and between the said parties that the submission hereby made shall, at the option and at the expense of either of the parties requiring the same, be made a rule of Her Majesty's Court of Queen's Bench at Westminster."

In **Belcher v. Roedean School Site and Buildings Limited**,† the Court of Appeal decided that where an architect was appointed arbitrator under the terms of a

* *Kemp* v. *Rose*, 27 L.J. Ch. 264. † 85 T.L.R. 468 (1901).

building contract, the mere fact that the builders or those claiming through them bring an action against the architect charging him with fraud in relation to the contract does not entitle them to revoke the submission.

Some protection the architect has, even if his drawings *cannot* be carried out, as the following summary of the important case which came before the House of Lords, relating to the rebuilding of Blackfriars Bridge, will show:—

"Where plans and a specification for the execution of a certain work are prepared for the use of those who are asked to tender for its execution, the person asking for the tenders does not enter into any implied warranty that the work can be successfully executed according to such plans and specification.

"The contractor for the work cannot, therefore, sustain an action for damages, as upon a warranty, should it turn out that he could not execute it according to such plans and specifications.

"A contractor contracted with the defendants to take down an old bridge and build a new one. Plans and a specification prepared by the defendants' engineer were furnished to him, and he was required to obey the directions of the engineer. The descriptions given were stated to be 'believed to be correct,' but were not guaranteed; and in one particular matter at least, he was warned to make examination for himself. Part of the plan consisted in the use of caissons. These turned out to be of no value, and the work done in attempting to use them was wholly lost and the bridge had to be built in a different manner. In this way much labour and time were wasted. The contract contained provisions as to the payment for extra work, and that work had (with the contract work) been duly paid for. The contractor sought for compensation, and for his loss of time and labour occasioned by the failure of the caissons, and in his declaration alleged that the defendants had warranted that the bridge could be inexpensively built according to the plans and specification. There was no express warranty to that effect in the contract.

"*Held*, that none could be implied.

"*Semble*, that if he had any remedy under these circumstances it was not in an action for damages as for breach of warranty, but for compensation as upon a *quantum meruit*." *

One of the leading cases relating to the liability of the architect when taking out quantities was that tried in 1879, and as it will most probably continue the *test* case, it will be necessary to give much of the argument in full, for nothing gives one a better knowledge of the *law* of a subject than attentively studying a case like this.

* *Thorn* v. *The Mayor and Corporation of London*, 1 App. Cases 120; 45 L.J.Q. (H. of L.), 487 (1876).

Architect preparing his own quantities.—The leading case is **Stevenson v. Watson,*** and was tried on the 6th and 7th of March, 1879. The plaintiff was a builder, the defendant an architect.

The architect was employed by a company to build a hall, and he prepared plans, drawings, specifications, general conditions of contract, and a *bill of quantities* of the works. Having done so, and the plans being approved, he was appointed by the company to carry out the works, and to be the architect under the contract proposed to be entered into by the company,

Next the company advertised for tenders, directing applications, with reference thereto, to be made to the defendant; and plaintiff, after examining the plans, drawings, specifications, and bills of quantities of the proposed works at the office of the defendant, sent in a tender, and the tender was accepted.

The plaintiff, at the request of the defendant, attended with his partner at the office of the latter, and signed the contract, the defendant witnessing the builder's signature.

The contract was made in the usual way—the plaintiff and his partner of the one part, and the company of the other part. The words were as follows :—

> NOTE.—The wording may be useful to readers not merely in illustrating this case, but also as giving one form of contract which is sometimes used.

"The said Richard Stevenson and Field Weston agree to erect and build for the said company . . . the hall, according to the drawings, general conditions of contract, and bills of quantities now produced and signed by the parties hereto, and intended to form parts of this agreement, and shall and will finish and complete the hall in such manner, and of such materials, and within such time as is provided by the said general conditions of contract and bills of quantities, and according to the said drawings; and further, that they, the said Richard Stevenson and Field Weston, will well and truly observe and perform all and every the said conditions and stipulations contained in the said general conditions of contract on the part of the contractors required to be observed and performed, and, in consideration thereof, the said company to pay unto the said Richard Stevenson and Field Weston the sum of

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* *Stevenson* v. *Watson*, 4 C.P.D. 148 (1879); 48 L.J., C.P.D. 318.

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£13,560 in the manner set forth in the said general conditions of contract, and in other respects to perform and keep the conditions and stipulations of the said general conditions of contract, so far as the same on their part is or ought to be performed and kept."

The general conditions of contract referred to in the contract, so far as they were material to this case, were as follows:—

"The general conditions of contract for artificers' works required to be done in the erection and completion of a new hall for the Nottingham Temperance Hall Company, Limited, Nottingham, Fothergill Watson, architect, Churton Street, Nottingham, January, 1874." "The architect is at all times to have access to the works, which are to be entirely under his control, and his clerk of the works. The architect may order any additions to or deductions from the contract without in any way vitiating the contract, and the amount of such additions to or deductions from the contract shall be ascertained by the architect in the same manner as the 'quantities' have been measured, and at the same rate as they have been priced at.

"The contractor and the directors will be bound to leave all questions or matters of dispute which may arise during the progress of the works or in the settlement of the account to the architect, whose decision shall be final and binding upon all parties.

"The contractor will be paid on the certificate of the architect."

The said bill of quantities contained (amongst others) the following stipulations:—

"Note.—These quantities will, with drawings and general conditions, form the basis of the contract.

"Should there be more or less measure than is here given, there will respectively be an addition to or a deduction from the contract.

"All measurements to be made in the same manner as the quantities have been taken, and all additions and deductions to be priced out at the same rate by the architect."

The contract was signed, and the plaintiffs proceeded with the work.

The defendant appears to have ordered, during the progress of the works, additions to and deductions from the contract.

The case in the Law Reports then proceeds thus—

"The defendant from time to time during the progress of the works, by his certificates, certified that certain sums of money were payable to the plaintiff and Weston in respect of the works executed by them, and gave the same to them, and the said sums, amounting to £10,000, were paid by the company upon the said certificates.

"The plaintiff, after the completion of the works, sent to the defendant accounts in respect of the works executed, showing, as the fact

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was, that, after adding to the contract the amount of the additions ordered by the defendant, and deducting the amount of the deductions ordered by the defendant, and making the stipulated additions in respect of the said errors in the bill of quantities, and giving the Company credit for the sum of £10,000 paid by them as aforesaid, there remained a balance of £1,616 6*s.* 7*d.* unpaid in respect of the works executed, and for which they were entitled to have the defendant's certificate.

"The defendant, without calling upon the plaintiff or Weston for any explanation of the said accounts, and without any communication with them on the subject thereof, made and sent to the plaintiff and to the company his certificate, certifying that the net balance due to the plaintiff over and above the amounts which he had previously certified was £251 14*s.* 4*d.*"

Paragraph 17 of the claim sets out that—

"The defendant did not use due care and skill in ascertaining the amounts to be paid by the company to the plaintiff under the said contracts, but, in ascertaining the net balance due to the plaintiff, neglected and refused to ascertain, and did not ascertain, the amount of the said additions to and deductions from the contract in the same manner as the quantities had been measured, and at the same rate as they had been priced out, or that there was more measure in the said description of works than was given in the bill of quantities, by making measurements in the same manner as the quantities had been taken, and neglected and refused to price out, and did not price out, the excess at the same rate, and make the stipulated addition to the contract in respect thereof, according to the terms of the contract; nor did he use due care and skill to ascertain, in the manner provided by the contract, what was in fact the net balance payable to the plaintiff by the company, in respect of the works executed for which the plaintiff was entitled to his certificate, but the defendant knowingly or negligently certified as aforesaid for a much less sum than was in fact the net balance payable to the plaintiff in respect of the works executed."

The next objection of the plaintiff is that the defendant refused to furnish plaintiff with the data upon which the certificate was based, and the plaintiff further alleged the defendant refused to give him any information on the subject. And the claim thus continues—

"The plaintiff thereupon requested the defendant to reconsider the said certificate, and offered to point out to him the said errors in the bill of quantities, and to give him any explanation he might require of the said accounts; but the defendant refused to reconsider the said certificate and to allow the plaintiff to point out to him the said errors in the bill of quantities, or to explain the said accounts, or to hear any objection whatever on the part of the plaintiff to the said certificate."

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This seems off-handed treatment, and one fails to call to mind an analogous case.

The plaintiff alleged—

"By reason of the premises the plaintiff was unable to obtain payment from the company of the balance, and had been deprived of and had wholly lost the same and the use thereof from the time when he was entitled to the certificate of the defendant for the amount thereof."

The reason the action was brought in one name was, it appears, because there had been a dissolution of partnership.

The plaintiff claimed damages £1,364 12*s.* 3*d.*, and interest.

The Defence. The exact words are again given—

"Demurrer on the ground that the statement of claim showed that the defendant was in the position of an arbitrator, and that he acted, and declared his decision, and the claim did not allege fraud or *mala fides*, and, therefore, showed no cause of action, and on other grounds sufficient to sustain the demurrer."

Now, at the risk of tiring the reader, all the arguments and the summing up are given *in extenso.*

"*Wills, Q.C.* (*Graham* with him), for the defendant. The claim is bad. The action is brought against a person in the position of a quasi-arbitrator, and therefore will not lie: *Pappa* v. *Rose.* There, the quality of raisins sold was left to the opinion of the selling broker. This Court and that of the Exchequer Chamber held that he was a sort of arbitrator, and consequently was not liable for failing to exercise reasonable care and skill in coming to a decision as to the quality of the fruit, he having acted *bonâ fide* and to the best of his judgment. So likewise an average adjuster, to whom the owners of a ship and the owners of its cargo referred a question as to the proportion of a loss to be borne by each, has been held to be in the nature of an arbitrator: *Tharsis Sulphur and Copper Company, Limited,* v. *Loftus.* An arbitrator is under no legal duty to use either care or skill.

"[Lord Coleridge, C.J. The position of the architect is peculiar, and is different from that of an average stater or fruit broker. The architect has an interest in reducing the builder's bill.]

"So had the engineer of the defendants' company in *Ranger* v. *Great Western Railway Company,* but the House of Lords held that the plaintiff contractor, who had bound himself to submit to the decision of the engineer, could not complain of his decision. In *Scott* v. *Corporation of Liverpool,* the contractor filed a bill against his employers and their engineer, complaining of undue delay by the latter in awarding the amount earned by the contractor, and sought payment of what was due upon the contract, but did not establish any case of fraud or collusion against the engineer. The bill was dismissed with costs. It is against public policy to allow this action. There is no precedent for it.

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If it could be maintained attempts would be constantly made to disturb the decisions of those chosen by the parties to fix sums payable. The claim alleges a duty in the architect towards the builder, which must be based on some implied contract. But there is none.

"[Denman, J. There is a duty to be honest. Suppose clear proof were given of a conspiracy between the architect and his employer to defraud the builder?]

"Fraud is not alleged in the present case.

"[Lord Coleridge, C.J. What if the architect has not, in a fair sense of the word, decided at all?]

"He has certified from time to time, and finally. The last certificate being given, the architect was *functus officio*, and was therefore right to decline to give another.

"*Cave, Q.C.*, for the plaintiff. The architect was not an arbitrator or quasi-arbitrator; but if he was, then he has been guilty of misconduct, for which the action will lie.

"First, his duty was simply that of 'measuring up' the work, to ascertain the amount of the additions to or deductions from the contract. This duty was merely ministerial, and such as he might delegate. He, no doubt, did delegate it to a clerk. The plaintiff entered into the contract on the faith that the architect would act upon the terms of it, and measure up according to the prescribed mode. It was to the advantage of the architect that the builder should undertake to carry out his plans, and therefore there was consideration moving from the plaintiff to the defendant for an agreement by the defendant to measure up the works according to the terms of the contract. If asked whether he would undertake to use care and skill when measuring up, he would of course have answered in the affirmative. Whereas an arbitrator does not undertake to use either care or skill, but only to be impartial. Valuation is not arbitration. For instance, an appraisement of hay and repairs which is made for the outgoing or incoming tenants of a farm by valuers between them, need not be stamped as an award: *Leeds* v. *Burrows.* The Courts have indeed somewhat extended the doctrine that protects arbitrators, to quasi-arbitrators, as in *Pappa* v. *Rose.* There, however, the broker undertook to give his opinion upon the fruit submitted to him. Moreover, a dispute had arisen. But the function of a mere valuer is not judicial, nor does it become so because two parties employ the same person to value the subject-matter of a contract between them. The architect here was appointed and employed by both parties. Possibly if he had not acted at all, the plaintiff could not have sued him for refusing to do so; but having accepted and entered upon his duties, he undertook to measure the work in the manner specified in the contract, and to bring care, skill, and professional knowledge to the performance of his duty: *Story* v. *Richardson*; *Jenkins* v. *Betham.* He is liable for a breach of that undertaking.

"Secondly, even assuming that he was a quasi-arbitrator, 'he was bound to exercise his judgment impartially between the contracting parties.' See per Blackburn, J., *Pappa* v. *Rose.* It cannot be said that he might even be dishonest with impunity.

"A building owner who colludes with the architect to deprive the

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builder of a certificate is liable to an action: *Batterbury* v. *Vyse.* And in *Ludbrook* v. *Barrett*, Grove, J., held, on demurrer, that an action would lie by a builder against an architect who fraudulently, and in collusion with the builder's employer, refused to certify if the architect had an interest in the building contract. Where there is such collusion, there is abundant authority to show that the action can be maintained. See per Erle, C.J., *Clarke* v. *Watson.* The claim alleges that the defendant 'knowingly or negligently' certified for a much less sum than was in fact payable. If he 'knowingly' did so it was a wilful act, whereby the plaintiff was injured. Moreover a claim may now be made, as this is, in the alternative. So if the architect either wilfully or negligently mismeasured the work the action lies. The plaintiff would be left without remedy if he cannot sue the architect, for his certificate cannot be set aside and another valuer appointed, as this is not an arbitration within the terms of the Common Law Procedure Act (17 & 18 Vict. c. 125, s. 12): *Collins* v. *Collins.* Romilly, M.R., said in that case, 'an arbitration is a reference to the decision of one or more persons . . . of some matter or matters in difference between the parties.' A valuation precludes differences, it does not settle those which have arisen. No dispute has arisen here, no judgment or opinion has been given.

"It was misconduct to refuse to hear the plaintiff, and to reconsider the certificate. The defendant has, in fact, not adjudicated at all. *Ex parte* proceedings before an arbitrator invalidate his award.

"*Wills, Q.C.*, in reply. The builder contracts with his employer on the terms that he shall appoint his own architect to watch over his interests; and that the architect's decision shall be final. He has to decide what are extras, and 'measuring up' requires the exercise of professional judgment. This appears from the contract and bill of quantities, which may be referred to as part of the claim. His certificate is a condition precedent to the contractor's obtaining payment. The architect is employed and paid by the building owner only, and makes no contract either express or implied with the builder.

"The plaintiff has neither alleged nor suggested fraud or collusion by the defendant, and it cannot be inferred from the use in the claim of the word 'knowingly,' which means that he knew what figures he put down and their result, and did not make his calculations by accident or mistake.

"Lord Coleridge, C.J. This is, no doubt, in some sense an action of first impression. If the true view of the case were only as Mr. Cave suggests, viz., that the plaintiff had undertaken to perform certain work under a contract made with a third person, to which the defendant was in terms no party, but that he was aware of and had acted under the contract which had imposed on him the duty of doing certain work requiring no judgment, no opinion, and requiring only the exercise of what I may call ordinary arithmetical powers, and the performance of his duty under that contract was necessary to the plaintiff's right to recover, yet the defendant had refused that duty, then I think the action would lie. But I am not aware that this form of action has ever been maintained. It is certain that in none of the cases cited the sup-

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posed duty was of the kind I have described, or the breach of duty was of the sort I have intimated. So, as far as I know, the action would be a fresh action unconcluded by authority, and for the maintenance of which there would be, in my judgment, very good grounds both in sense and law. But I am of opinion that is not the case before us. This claim is for that which has been over and over again attempted without success. It is an action against a man for the negligent performance of a duty, in the doing of which the exercise of judgment or opinion is necessary. Such being the true view of the claim, the cases on that point apply and bind us. Speaking for myself, I entirely approve of them, and think them sound and right.

"The action is by a contractor—not against his employer, but—against the architect of the building owner and, if you please, the architect of the contractor himself, under a contract, the material parts of which are sufficiently set out in the claim. [His lordship read them.] The work appears to have been done, and during the performance of it the defendant ordered additions to and deductions from the contract. The plaintiff states there were errors in the bill of quantities, and that there was more 'measure' in certain descriptions of work than given in the bill of quantities. That means, I suppose, that under the bill of quantities he had to do more work than he thought he should have to do. It is then alleged that the plaintiff was paid certain sums of money, and that he, after the completion of the works sent—not to the building owner, but—to the defendant accounts, showing a balance for which he was entitled to have the defendant's certificate; that the defendant, without calling on the plaintiff for an explanation or communicating with him, made and sent to the plaintiff and to the company a certificate for a net balance of £251 14*s.* 4*d.* only. On these facts the plaintiff states his cause of action. [His lordship read it.] Now it is said that the statement of action is of this limited kind; that the only duty cast on the defendant was a purely ministerial and clerkly duty; that he had to make certain arithmetical calculations; and that if they had been properly made, £1,600 was due to the plaintiff; that he did not make and would not make those calculations which were purely arithmetical and called for the exercise of no judgment and demanded no exercise of opinion at all; and that for not doing this purely ministerial duty, inasmuch as it damaged the plaintiff to the amount of £1,364, the action lies. If, as I have already said, that were the true construction—and these paragraphs put the true construction on the contract – I should have been, as at present advised, of opinion that the action would lie, and I say so assuming the right view of the words 'knowingly or negligently' to be that presented to us in the able argument of Mr Wills, viz., that 'knowingly' does not necessarily mean and must not be taken to mean fraudulently. It is capable of a milder interpretation, viz., that knowing a particular mode of calculation would bring out a certain result, the defendant brought out another, and therefore it was wrong to his knowledge or within his means of knowledge. But when regard is had to the contract, and to the duty to be performed under it, it will be seen plainly that the duty is not merely ministerial or clerkly, and, looking at the contract itself, and the bill of quantities according

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to which the deductions or additions are to be calculated, it is manifest at a glance that in order to arrive at the amount of additions or deductions a great deal more than arithmetical calculation is necessary. The quality of the work, and the extent to which particular deductions or additions came within particular heads of the bill of quantities, are questions perfectly fit for the determination of an architect; and in many cases it would be necessary and, probably, in all cases actually required that there should be an exercise of considerable professional judgment and skill, and that before the arithmetical result of so many feet of work and so many pounds and shillings for the work could be arrived at, there must be knowledge of the work, familiarity with the bills of quantities, professional understanding to comprehend the technical terms, and judgment to say under which head the deductions or additions ought to be placed. I think, therefore, it is plain when the documents which I am told we must treat as part of the claim are looked at, that although, no doubt, the result is one of figures, yet before it can be arrived at, there must be an exercise of professional knowledge, skill, and judgment. Moreover, it seems to me that it is so provided for by the contract, and that the true view of the contract is that presented by Mr. Wills, viz., that before the plaintiff can recover sums of money from the building owner, there must be the certificate of the architect to ascertain what sums are due from the building owner to the plaintiff. Now, if I have rightly described the position of the defendant with respect to the plaintiff, it follows from the decided cases that this action does not lie. Where, indeed, the building owner and the architect collude together, and in collusion the architect fraudulently abstains from doing his duty towards the builder, there is the authority for saying that he can maintain an action against the building owner: *Batterbury* v. *Vyse*; or the architect: *Ludbrook* v. *Barrett*. It must be left to the Court of Appeal to overrule those cases if they are wrong. They are directly in point, and seem to me founded on clearest sense and justice; but they are not this case, because here neither fraud nor collusion is suggested, unless fraud and *mala fides* be suggested by the word 'knowingly,' which, for reasons already given, I do not think can be, nor does Mr. Cave go so far as to say so. I think this case is within the authority of the cases cited, which decide that where the exercise of judgment or opinion on the part of a third person is necessary between two persons, such as a buyer and seller, and, in the opinion of the seller, that judgment has been exercised wrongly, or improperly, or ignorantly, or negligently, an action will not lie against the person put in that position when such judgment has been wrongly, or improperly, or ignorantly, or negligently exercised.

"I will not discuss the principles on which they rest; it is enough to say that in those judgments pronounced by Courts of co-ordinate jurisdiction, and also in the Exchequer Chamber, I entirely concur, not only on authority, but on grounds of reason and sense.

"Therefore, it seems to me that the first part of the claim is disposed of, and the demurrer must be allowed so far as it applies to paragraph 17. It remains only to consider paragraph 18. I think that what is therein stated is no ground of action at all. There, again, *mala fides* and collu-

sion are not even suggested. It alleges simply that the architect, who is by the contract to form an opinion, and who has formed an opinion, and expressed it, declines to say on what he grounded it, and to hear argument offered to show that the opinion was wrongly formed. I think if his position be such as I have described, he is not bound to give the grounds of his opinion, or to reconsider it, and that the person who has taken him for better and for worse (not as architect, for that is the wrong ground to put the case on, but) as one whose opinion is a condition precedent to the obtaining of a sum of money, cannot bring an action against him for refusing to give the ground of his opinion, or to hear evidence tendered to show that the opinion was wrong. I think that is the better ground to put it on, because I at first thought he might, on a certain view of the facts, be regarded as an arbitrator who had not arbitrated, and that perhaps an action might be maintained (according to obvious analogies), not for doing his duty ill, but for not doing it under any circumstances. But those cases have only been where there has been a dispute between the plaintiff and the building owner, and I doubt whether here any such dispute has arisen. So, assuming that I am right in my supposition that he is made arbitrator between the parties, and on declining to arbitrate could be forced to take upon himself the duty of deciding after reasonable inquiry, I do not think that arises here, for no kind of dispute on the facts before us has arisen.

"The demurrer must be allowed.

"Denman, J. I am of the same opinion. The plaintiff, who is a builder, entered into a contract with the company to erect a large building; and the defendant is the architect who was named in the contract as the person appointed and agreed upon by them to do certain acts without which the plaintiff would not be entitled to the money for his work. There is no direct contract between the plaintiff and the defendant. The defendant does not sign it, and is not made a party by being mentioned in it, except for the purpose for which he was mentioned. But it is contended that he is bound by that contract so as to be liable, either as a person who has contracted to do certain things which he has neglected, or that by virtue of his office he owed a duty to the plaintiff which he has neglected. I am not prepared to say that it is impossible to conceive a case in which he might not be liable on the contract itself, knowing that he is named in it, and accepting the duties under it, and receiving certain benefits out of it, as in every case where an architect is employed. A case is conceivable where, by acting under a contract he might become so far a party as to be liable either under the contract or in respect of rights and duties arising by reason of the office assumed, which would give a right of action to either party. But supposing a duty does arise, the question is what is the amount of the duty? It appears to me that he does not, by undertaking the office of arbitrator, undertake any duty amounting to more than that of honestly performing his functions.

"Suppose the case alleged that the defendant, having undertaken the office of architect and arbitrator between the building owner and the contractor, fraudulently or corruptly, or in collusion with the building

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owner, dishonestly took a course which he ought not to have taken, and so injured the plaintiff, I have, as at present advised, no doubt whatever that an action might have lain against him. There are many dicta to that effect. But the question is, what duty did he here undertake? That depends on the nature of the employment of an architect who acts under a contract of this kind. I do not intend to hold that he is to all intents and purposes an arbitrator, but I think that his duties are very analogous to the duties of an arbitrator, and are quite as much so as were those of the defendant in *Pappa* v. *Rose* or *Tharsis Sulphur and Copper Company, Limited*, v. *Loftus*. The argument of Mr. Cave is that under the present contract the architect was not an arbitrator or a person appointed by the parties to decide questions requiring exercise of discretion, skill, or, in one sense, judgment at all, but was a kind of appraiser or valuer, to look at certain work, cast up certain figures, and do rather clerkly than judicial work, or the work of an arbitrator, which requires the exercise of skill and judgment. So to hold would be to ignore the experience of every member of the bar and bench who has had to do with building contracts, and as very many of us have had great experience of them we ought to take it into consideration. We know that it frequently happens in references that there will be skilled architects called on one side and on the other, who very often honestly differ as to the proper mode of measuring up, and disagree to the extent of hundreds of pounds as to what is owing under a bill of quantities. This appears to me enough to show that an architect is not to be dealt with as a mere caster-up of figures, who, if he makes a mistake, is to be looked upon as guilty of negligence because he has cast them up wrongly, but as one having to do something requiring judgment, discretion, and skill, and I think that he is a person exercising very important functions requiring skill and judgment in cases of this kind. That being so, *Pappa* v. *Rose* and *Tharsis Sulphur Company, Limited*, v. *Loftus* apply. The only distinction pointed out by Mr. Cave was that in one case an actual dispute had arisen, and therefore the defendant was an arbitrator, whereas he might not be so before a dispute. But it seems to me that the architect is an arbitrator from the beginning to the end of the contract; he is throughout to have his eye on the work, and give certificates from time to time, all having reference to his final certificate, and, unless he gave the duty up altogether from the first appointment, he is from the first a person exercising judgment on a matter on which the parties cannot exercise judgment.

"I think, therefore, that the parties have trusted to him, and that from the beginning he must exercise his functions fairly and honestly between them, and that if he violates that duty he is liable to an action. If he honestly performs them then he honestly performs his bargain, if it be a bargain, or his duty, if it be a duty, arising from the acceptance of the functions, and the parties must abide by it. But it is said that paragraph 17 carries the case further, because it alleges that the defendant 'knowingly or negligently' certified for a much less sum than was in fact due. It would, I think, be a bad precedent were we to hold that by cramming into the claim such a word as that, it could be expanded into meaning 'fraudulently, dishonestly, and corruptly,' charges quite

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different from what was here intended. But I think that word 'knowingly' equivalent to 'knowing the figures put down.' It would have been easy, if necessary, to use the words 'fraudulently and corruptly.' Paragraph 18 remains to be considered. The answer to the contention in it appears to me to be that the defendant would have done very wrong if he had, at the mere request of the plaintiff, and without any dispute having arisen between the parties, but on the complaint of the plaintiff alone, reopened the matter and determined to reconsider his certificate. No dispute had arisen between the parties. The only dispute which had arisen was between him and the builder, and all that appears was that the builder was dissatisfied with the certificate. I think that claim also is ill-founded, and that our judgment should be for the defendant."

Where quantities not used.—A point that will sometimes arise is set forth in the well-known case **Gwyther** *v.* **Gaze.*** Here Mr. Gwyther prepared quantities upon the instructions from the architect engaged. Tenders were received based on these quantities, but none accepted. The architect reduced the height of his building, and some other builder had the contract. It does not appear very clear why the original builders were not asked to tender again for the reduced building; but it is gathered from the report that they were not. Not unnaturally, Mr. Gwyther wanted payment, but the building owner does not appear to have been willing to pay for his services, and so he had to bring an action for his percentage of $2\frac{1}{2}$ per cent. on the lowest tender, the demand being in the usual way. Oddly, Mr. Justice Quain thought a difference should be made between the cost of the preparation of quantities where one of the tenders was accepted and where no tender was.

Now can any one imagine a more fallacious doctrine? and one is surprised that so careful and learned a judge should have propounded so novel a doctrine. The quantities could cost the surveyor no more labour whether the tender is accepted or not, and yet his lordship's decision was that if a tender is accepted, then $2\frac{1}{2}$ per cent. on the lowest tender is fair; but that $1\frac{1}{2}$ per cent. would be sufficient if from any cause (so it would appear) the building owner refused to accept the lowest or any tender.

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* *Gwyther* v. *Gaze*, *Times*, February 8th, 1875.

Where clients liable for quantities.—Another case in which the authors were consulted was **Waghorn** *v.* **Wimbledon Board of Health.*** In this matter Mr. Rowell, the surveyor to this Board, had by order prepared plans for cemetery chapels. He then instructed the quantity surveyor to prepare quantities, and thereafter tenders were received. The lowest tender being beyond the contemplated outlay, all tenders were declined. Some time after, the demand was made by the quantity surveyor for payment. The Board's reply and pleading was that they had never authorised Mr. Rowell to employ the quantity surveyor.

The ruling was that as the Board had instructed their surveyor to obtain tenders, they had therefore authorised him to have quantities taken out, and that tenders could not be made without quantities. See also **Moon** *v.* **Guardians of Witney Union,** 3 Bingham, N.C. 814 (1837).

Where builder not liable.—The ruling in the case **Taylor** *v.* **Hall**† ought to be mentioned, although it was tried some years ago, and the circumstances of the case were unusual. Chief Justice Monahan said—

"That according to the usage of the trade, if the *owner* discarded the architect's plan, he was liable to the *surveyor*, the *architect* having the express or implied authority of the owner to employ him; that the *builder* who carried out the new plan, though he might have tendered under the old plan, was not liable if he did not use the surveyor's calculations; and that the contract here, not being any modification or continuation of the original contract which was in negotiation with defendant, but an entirely new independent contract by the present defendant in his own right, he was not liable. The uncontradicted evidence of his foreman, who acted for him, being that the plaintiff's calculations were not used,

"*Held*, that surveyor could not recover for the quantities.

"Apparently the surveyor should have sued the *owner* in this case, and not the builder."

Where architect personally liable.—Care should be taken by the architect to disclose to the surveyor he asks to prepare

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* *Waghorn* v. *Wimbledon Local Board of Health*, *Times*, June 4th, 1877.

† *Taylor* v. *Hall*, *Irish L.R.*, 4 C.L.R. 467 (1869-1870).

the quantities the name of his employer, and, in fact, the best plan is to put in writing all the particulars, because the case **Burnell** *v.* **Ellis**,* in the year 1866, shows that without such precaution the architect may make himself personally liable. In that case the tenders received were all refused, as being too high, and the intention of the company to build abandoned, and then the surveyor who had prepared the quantities claimed from the architect £100, reducing the amount to £50 as the works did not proceed, and obtained a verdict for that amount. The case of **Gordon** *v.* **Blackburne**† also favours the assumption that the architect must pay for quantities unless he takes care to disclose his principal. In that case Mr. Gordon had seen only Mr. Blackburne. The drawings did not inform Mr. Gordon who the principal was. He had had previous transactions with the architect, and received payment from him direct. The judge appears, in his summing up, to have asked the jury to say whether there was anything differing from the usual position of architect and quantity surveyor, as, if not, the verdict must be for the architect; if there was, however, a personal employment of the quantity surveyor and a promise to pay, the architect would be liable.

The jury decided the architect had personally employed the quantity surveyor.

Where owners not liable.—Now, an architect by his conduct may prevent the surveyors who take out the quantities having any claim against the principals. The case of **Richardson and Waghorne** *v.* **Beales and others** ‡ is cited. In this case the plaintiffs, the quantity surveyors, had to submit to a nonsuit because the architect stated that he had received a communication from the committee, accepting his design, and informing him that he might obtain tenders, but in so doing he must not pledge the committee in any way.

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* *Burnell* v. *Ellis*, *Times*, June 25th, 1866.

† *Gordon* v. *Blackburne* (Lord Mayor's Court), *Builder*, February 1st, 1879.

‡ *Richardson and Waghorne* v. *Beales*, *Times*, June 29th, 1867.

Architect's fees do not include fees for quantities.—In **Restell** *v.* **Nye**,* the defendant (an architect) had agreed to accept 5 per cent. for "plans, specifications, and supervision of works." The defendant was paid by the builders 2½ per cent. (which was the amount included in their estimate), for the quantities.

Held that the agreement did not cover such cost. The plaintiff also sued for negligence. Mr. Justice Mathew held that damages were not recoverable, as the architect was in the position of arbitrator. This latter dictum was upheld in the case of **Chambers** *v.* **Goldthorpe**.†

Both decisions were upheld in the Court of Appeal (84 T.L.R. 444).

When payment due.—As to when the builder is to pay, the decision in the case **McConnell** *v.* **Kilgallen** (2 Irish C.L.R., 119, 1878), makes the time of payment directly the contract is accepted, and this although there may be a stipulation in such contract that the commission is to be paid out of the first instalment. In this case, however, it should be borne in mind that it was the action of the contractor in abandoning the job that prevented any first instalment ever being paid, so that we may assume that in ordinary cases the contract would determine the time of payment, and that this decision only relates to those cases where no first instalment is ever paid. Then as to the payment of quantity surveyors for other work done by them in connection with the preparation of the bills of quantities, in the case heard in October 1887, **Schofield** *v.* **Barnardo and Gregg**, the surveyor claimed for the preparation of specification, and for repayment of moneys he had expended to have the iron girders tested, and for going to the premises to take measurements of old buildings. The authors were called on behalf of Dr. Barnardo, and in their evidence pointed out that the quantity surveyor was not entitled to charge the architect's client for these works. The jury in their verdict agreed with this view.

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* (1900) 16 T.L.R. 154. † (1901) 1 K.B. 624.

The following case shows when the liability of the employer passes on to the builder :—

When liability passes to the Builder.—In **North** v. **Basset** * a quantity surveyor brought an action in respect of a sum of money alleged to be due to him from the defendant, a builder, for work done as such surveyor. Plaintiff was employed by an architect to take out quantities for a certain building, which he did. Defendant's tender was accepted, and he entered into a contract to build. Plaintiff applied to the builder for his fee, but was refused, hence the action. In the estimate for the work to be done was the following :—"To provide for copies of quantities and plans, twenty-five guineas to be paid to the surveyor, D. H. North (the plaintiff) out of first certificate." At the trial evidence was given that the custom is that the architect employs the quantity surveyor, that the surveyor supplies the builder with the quantities, and the builder holds him responsible for the accuracy thereof, and that the quantity surveyor's fees are added by the builder to his tender, and are paid by the builder to the surveyor out of his first cheque. Plaintiff was nonsuited on the ground that there was no privity of contract between the plaintiff and defendant, and that the alleged custom would not support the plaintiff's claim. Plaintiff appealed, and on his behalf it was contended that the said custom was good and recognised, and that the builder by tendering enters into an implied contract that if his tender is accepted he will pay the quantity surveyor.† For the defendant it was argued that no such custom existed, that the surveyor must sue the architect, and that he could not bring an action on a written document to which he was no party.‡

Held, that this case did not come within the decision of **Priestly** *v.* **Stone,** that such a custom as was alleged did exist.

* (1892) 1 Q.B.D. 333; 66 L.T., N.S., 189.

† *Moon* v. *The Guardians of the Poor of the Witney Union*, 3 Bing. N.C. 814; *Young* v. *Smith*, see Hudson on Building Contracts, p. 784.

‡ *Priestly* v. *Stone*, 4 Times L. Rep. 730; *Bradburn* v. *Foley*, 38. L.T. Rep. N.S. 421; L. Rep. 3 C.P. Div. 129; *Locke* v. *Morter*, 2 Times L. Rep. 121.

and was a notorious one, and that there was abundant evidence of a promise by the defendant to pay the surveyor. As there had been a nonsuit, which was wrong, the case must go back to be tried again.

This was confirmed in **Mellor** *v.* **Britton**,* where the builder did not even receive the first instalment on the contract, but entered into an arrangement with the building owner, when it became due, to take over the building agreement; Bigham, J., holding that the assignment of the building agreement could not prejudicially affect the claim of the plaintiff.

On January 19th, 1900, the *Irish Times* reported the case of **Northcroft and others** *v.* **Delaney & Company**, in which the jury found that the quantity surveyors were entitled to their fees, but that the liability lay on the building owner and not on the contractor; the latter contending that there was no contract with them, and that the quantities were unnecessary in this case. This was an Irish case in the High Court, but it does not affect the ruling of **North** *v.* **Bassett** (see *supra*), as the facts appear to be different.

Are surveyors liable for accuracy of quantities?—The much-vexed question that surveyors who take out quantities have to consider is—If quantities are deficient, are they liable to the owner or the builder? The unusual case of **Scargill** *v.* **Shoppee and another** may here be mentioned. In this case the client who had the mansion built was suing, under the advice of his architect, the quantity surveyors for *excessive* quantities.

As the authors were engaged in this case for the defendants, who were successful, they will only state that a very careful examination of the drawings and specifications enabled them to say that there was no just cause of action against them. Oddly enough, only a few months before this action was brought, an action was threatened against the same defendants by the builder for deficient quantities.

Now, as to action for deficient quantities, it has already been stated elsewhere that the fear of such actions does, we fear, in

* 28 T.L.R. 465 (1900).

some cases induce the quantity surveyor to *weight*—that is the expression—his quantities to prevent such actions.

This is not just to the employer, however, as he thereby pays more for the building, and virtually pays the insurance money, small or great, according to the timidity of the quantity surveyor.

Why is it employers so often refuse to have quantities? They will tell you the reason is that where quantities are taken out the building costs so much more.

It would appear that if quantities are short, the builder has no remedy against the employers. The case **Scrivener and another** *v.* **Pask** * is a case in point; Mr. Justice Blackburn remarking that if there had been misconduct on the part of the architect who took out the quantities the plaintiffs had their remedy against him. It may be said that he who pays for the quantities has a remedy against him who prepared them if negligence can be proved. There must in law be a payment for work done to enable a person to complain of that work. If, therefore, the successful builder pays for the quantities and they are short—he is *not* likely to complain if they are full —it would appear that he has his remedy *if he can prove negligence* (which is very difficult), unless something has been said or written to exonerate the surveyor who took out the quantities.

The case of **Priestly and another** *v.* **Stone** † was in favour of the surveyor, but in this case the quantities were prepared from pencil drawings which were materially altered, and others were added. Moreover, a clause numbered XI. was inserted in the contract to the effect that the contractor must examine the drawings and specification and compare them, so as to satisfy himself that his price included all the works and materials shown or described, and no departure or alteration to be made in the tender in the event of any error being discovered. There was a nonsuit in this action, and this was upheld in the Court of Appeal.

* 1 C.P. 715; 18 C.B. N.S. 785.
† 4 T.L.R. 730 (1888).

In **Ford & Co.** *v.* **Bemrose & Sons,*** before the Court of Appeal, the judgment of the Master of the Rolls and Lords Justices Romer and Mathews reversed that of the Court below, and though the arbitrator had found it to be a fact that there was a custom in the building trade for the contractor to assume that quantities supplied are correct and to tender upon the same without verification. The arbitrator had also found that it was a custom to modify the price by an amount ascertained and determined by the scale of prices given in the tender when such quantities proved greater or less than the quantities supplied.

The Master of the Rolls, in giving judgment, after stating the facts, said that the point in question did not arise for the first time. It seemed to him that it was the well-ascertained practice for the building owner, who was placing before the builder the materials upon which the work was to be done, to give him the plans and specification, and he generally gave him also the quantities. But it was well understood, and it had been settled in more than one case, that this document—the bill of quantities—whether it was embraced in and made part of one of the other documents—whether in the specification or by a schedule to the contract—or was a separate document altogether, it was not, and was not intended to be, a representation to be acted upon in the sense that it was to be deemed to be a warranty. The most that could be said of it was that it was an estimate which a reasonable person, such as a builder, would probably act upon as being an honest representation made by a skilled person; but beyond that it did not go. In the present case it was made a term of the contract that the person whose tender was accepted must deposit with the architect within fourteen days a priced bill of quantities. So that the builders accepted the obligation of furnishing the bill of quantities. It might be easier for them to put the prices on the quantities sent to them than it might be to adopt the quantities so sent. But it was part

* *Builder*, March 22nd, 1902.

of their obligation to furnish a bill of quantities, and they were not relieved from that obligation because they chose to accept the quantities sent to them by the building owners. That was what occurred in the present case. That being the common sense and business aspect of the case, it could not be pushed beyond that. You could not turn an estimate made for the convenience of all parties into a contract. His lordship thought that the mistake as to the quantities—there being no warranty, and there having been no representation which was not perfectly *bona fide* and honest—was not proper subject matter for a claim for work done thereunder. The work which the builders had done was work done under a contract, and having done it under the contract, and under nothing else, they could not claim under another contract which in point of fact was never made. He thought that the crucial point in the case was that it was a contract for a lump sum. It seemed to him that his learned brothers in the court below were wrong in the view they took of this contract. They seemed to have been imbued with the view that there was an apparent hardship on the contractors who had found themselves bound to spend more money than they had calculated upon by reason of the mistake in the bill of quantities. The answer to that was that it was perfectly competent for the contractors to make their own estimate. He thought that the appeal should be allowed, and the decision of the Divisional Court reversed. Thus, unless negligence can be proved, it would appear that no claim against the surveyor can be sustained.

Express Agreement.—When acting under express agreement the surveyor is of course liable in respect to the terms of such agreement.

Where no quantities are taken out.—The following case is given to show that unless quantities are taken out the Courts appear to consider the employer cannot expect any limitations to his expenditure. The *Times* report of 5th November, 1891, is quoted from. The case is **Archer and another** *v.* **J. W. Hobbs & Co.**

"This was a dispute between the 'building owners' and the architects of the enormous building in course of erection at Albert Gate, Hyde Park (nearly opposite Sloane Street), the great dispute being whether, the owners having told their architects that the cost of the building was not to exceed £100,000, the architects had been guilty of negligence or want of due care and skill in allowing the expense to amount to £200,000, which had been the actual expenditure. It appeared that the building had been undertaken and begun without specifications and detailed estimates upon 'quantities' actually 'taken out,' and the case is important, because it was laid down again and again by the late Lord Coleridge, and appears to have been in a great degree the basis of the decision, that if a building owner desires to limit his expenditure on a building he should have detailed specifications and estimates on 'quantities taken out,' and stipulate expressly that there shall be no expenditure beyond, unless allowed by written orders either of the employer or his architect."

Surveyor as Architect's Assistant.—A curious point was raised in the case of **Dollar** *v.* **Higgs and another.*** The plaintiff (an architect) employed a quantity surveyor to complete the measuring up of some work, because, he stated, there was more work in his office than his staff could cope with. The defendants paid over to the said surveyor the 2½ per cent. on the amount of the contract which was included in their certificate. The plaintiff contended that such payment should have been made to him and not to the surveyor who was acting as his assistant. Mr. Justice Wills upheld this view, and gave judgment for the plaintiff for the amount claimed less one-third, which was admittedly due to the surveyor.

Final Measuring.—With regard to measuring up at the final settlement, the case reported in the *Builder* of 2nd July, 1887, should be borne in mind; **Inery** *v.* **Pawson and Brailsford,** which, although only a County Court decision, has the advantage of being the decision of that able judge,

* *Times*, December 8th, 1900.

Ellison. Shortly, the case was an action brought to recover commission for quantities. The plaintiff claimed one sum of £22 5*s.* and another of £75 8*s.*, together £97 13*s.* The defendants had paid into court £53 2*s.* and £3 3*s.* costs, and that, they said, was all that they were liable for; the real point at issue, however, was whether the defendants were liable to the plaintiff or Messrs. Longdon (the contractors). The case was entered for hearing in a superior court, but the defendants had paid the £53 2*s.* in order to bring the action within the jurisdiction of the County Court, and not because they admitted their liability for any part of the sum claimed.

The contractors in evidence stated that they had paid the 2 per cent. for the quantities on which the contract was taken, but had not paid a claim of the plaintiff for £103 dated 5th January, 1886, because when the work was measured up the proprietors always paid the commission on additions and omissions unless the amount was added to the builder's account. The builder did not pay on measuring up unless he received it from the proprietors. They did not receive it from the proprietors. The architect stated that the quantity surveyor was engaged with the defendant's sanction to prepare the quantities for the new building, and that his certificates were given for the amount due "pro rata" according to the contract, and including what was due to the quantity surveyor, but the amount was not specified. He dealt with the commission on the omissions and additions in a final certificate to the contractors. It was then specifically arranged that the sum of £103, the commission due to the plaintiff on these items, should be paid by the defendants, and he withheld his final certificate until that arrangement had been accepted by the solicitors on each side, and he never called upon the contractors to pay it. After hearing the evidence of the defendant, the Judge said he thought the evidence that had been called was in favour of the plaintiff; although called on behalf of the defendants, it had entirely failed to support the case, and he therefore directed the jury to find a verdict for the amount claimed, with the sum paid into court, which was done.

P. C. Sums.—In **Hobbs** *v.* **Turner** * it was upheld by the Court of Appeal that the plaintiff who supplied metalwork upon a building (the contractor for which had signed the form of contract settled by the R.I.B.A.) could successfully sue the building owner for the value of the same; the said metalwork being provided for in the specification by a provisional sum. The defendant repudiated liability, and alleged that he had a claim against the contractor for bad work. In this case the architect had certified for the amount direct to the defendant.

In conclusion, it should be pointed out that it is wiser and safer to have a clear understanding with your client before having the quantities taken out; then no legal question can arise as to who is liable to pay for them.

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* 18 T.L.R. 235 (1902).

CHAPTER XXII

EXAMPLES OF TAKING OFF, ABSTRACTING AND BILLING

TAKING OFF

PROPOSED ENTRANCE LODGE, _____ ROAD, _____
_____19—. FOR_____.

[ILLUSTRATED IN PLATES 1–10 PLACED AT END OF BOOK.]

PRELIMINARY.

The site is on the — side of the entrance road leading from — Road to the Manor House.

The building to be completed fit for occupation by the — day of —, or the contractor is to pay £— per week as agreed liquidated damages, delay consequent upon strikes only excepted.

In case of extra works, the time shall be extended one week for every 100*l.* worth of additional work.

Payment will be made to the contractor at the rate of 80 per cent. upon the value of the work executed until completion, when an additional 15 per cent. will be paid, and the remaining 5 per cent. at the expiration of 6 months.

No part of the work to be let as task work.

A fully priced copy of the estimate is to be deposited with the architect within a week of signing the contract, extras and omissions to be valued at the prices of the contract, and any item of extra work which does not exactly agree with the descriptions of the original estimate to be valued at a price analogous thereto.

The contractor will be required to keep an approved foreman constantly on the works.

Allow for insurance from fire to the amount of tender, and deposit the policy with the architect.

Allow for supplying water for all the works, including fees, temporary plumbing, and storage of water.

Allow for giving all notices to all authorities requiring notice, and to pay all fees.

Area of building:

squares, 2 stories high.

squares, 1 story high.

Allow for all scaffolding, rods, &c., and stakes and labour in setting out works.

Allow for an office for clerk of works, and the requisite firing, light and attendance, and for all sheds, &c. required for materials.

Allow for enclosing the site with an approved post and rail fence, and for preventing the men trespassing on any other part of the ground than that enclosed.

Allow for covering the walling during inclement weather, and provide for any other requisite protection.

Allow for making good any injury to the building from any cause, and for making good pointing after injury by frost.

Allow for any necessary watching and lighting.

Allow for erecting, maintaining, and altering as may be required a proper hoarding, with all necessary gates and fastenings, &c., to the satisfaction of the local authorities, with proper returned ends; length of front, — feet.

Allow for keeping the works in proper repair for — months after completion, and for making good any defects or imperfections that may arise during that period.

Allow for clearing away all dirt or rubbish and superfluous materials as they accumulate, and for twice scrubbing all floors at completion, and for leaving the whole of the premises clean, and for levelling up at completion round the building.

	24·3 22·0	533·6	Area for D. S. fees. 2 stories
	12·0 5·0	60·0	Add do.
		593·6	
	10·6 2·0	21·0	Ddt. do. seat.
		572·6	
	20·0 9·0	180·0	1 story. Back.
	7·6 4·0	30·0	Add W.C.
2/½	5·0 3·0	15·0	Add bay (average).

4·0 2·0	8 0	Add bay (average).
10·6 2·0	21·0	Add seat.
	254·0	

EXCAVATOR.

Remove all garden ground to a distance of 50 yards and stack for use.

The concrete to be composed of 1 of Portland cement to 6 of clean sharp gravel.

The cement to be the best quality Portland cement, and to be of an approved manufacture.

The drain pipes to be of Doulton's or other approved make and to be tested; the joints to be formed of tarred oakum and filled in with cement.

39·2 33·2	1299 0	Dig R. surface soil 9″ thick as above (main buildings).
		N to S 37·0 foots 2/ 1·1 = 2·2 39·2
		E to W 31·0 2/ 1·1 2·2 33·2
		7·0 2/·10½ = 1·9
3·3 8·9	28·0	Add do. (W.C.) 8·9
	1327·0	
17·3 9·0	155·3	Ddt. do. (N.E. of archway)
12·6 10·6	131 3	Ddt. (S.W. of stairs, averaged)
	286·6	

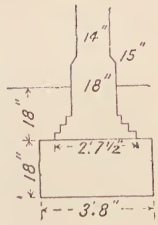
Collection of 1½B *walls with plinth (both sides).*

N. wall of archway 22·0

Footings and concrete 2/ 15″ 2·6

Projections for piers 2/ 3/ 9″ = 4·6

29·0



29·0		
3·8		
1·6	159·6	D. R. P. F. I. and ram to foots, and cart away surplus about ½. (N. wall of archway.)
29·0		
3·8		
1·6	159·6	D. R. and cart away. (Trenches.)
29·0		
3·8		
1·6	159·6	P. cement concrete. (Trenches.)

1½B *walls with plinth one side only, wall S. of archway.*

22·0

2/ 1·3 = 2·6 Both ends.

3/ 9″ = 2·3 Buttress.

11·0 S. of stairs.

2/ 1·3 = 2·6 Ends.

9·9 Bay.

2/ 1·3 = 2·6

52·6

52·6		
3·8		
1·6	288·9	D. R. P. F. I. and ram to foots *a b*.
52·6		
3·8		
1·6	288·9	D. R. and cart away *a b*. (Trenches.)
52·6		
3·8		
1·6	288·9	P. cement concrete. (Trenches.)

1½B *walls without plinths.*

Staircase walls 2/ 9·0 = 18·0

Less 4/ 1·3 = 5·0 projections.

13·0

Add North of yard 3·6

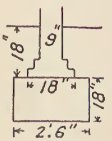
16·6 carried forward

1B *walls with plinth one side.*

		16·6 brought forward.
		E. side of sitting room 5·0 circular.
		Kitchen, North wall 7·6
		Do. & scullery, E. „ 1·80
		Scullery, S. „ 10·6
		N. „ 7·6
		65·0
65·0		
3·3		
1·6	316·11	D. R. P. F. I. and ram to foots *a b*.
65·0		
3·3		
1·6	316·11	D. R. and cart away *a b*. (Trenches.)
65·0		
5·3		
1·6	316·11	P. cement concrete. (Trenches.)

1B *walls without plinth.*

		Division of scullery 4·0
		W. of yard ... ... 9·0
		E. of W.C. ... ... 3·3
		16·3
		2 cross walls, W.C. :—
		2 5·6 11·0
		less 2/2/10½" = 3·6
		7·6
		W. wall of scullery 6·6
		less 2/10½" 1·9
		4·9
		28·6
28·6		
2·6		
1·6	106·11	D. R. P. F. I. and ram to foots *a b*.
28·6		
2·6		
1·6	106·11	D. R. and cart away *a b*. (Trenches.)



	28·6		
	2·6		
	1·6	106 11	P. cement conerete in trenches.
	7·6		
½/	6·0		
	1·6	33 9	D. R. P. F. I. and ram to foots (angle bay) *a b*.
½/	7·6		
	6·0		
	1·6	33 9	D. R. and cart away *a b*.
½/	7·6		
	6·0		
	1·6	33 9	P. cement concrete in trenches *a b*.
	8·3		
	11·9		
	2·0	193 11	D. R. and cart away under floors *a b*.
½/	4·0		
	2·0		
	2·0	8 0	Do. add (average).
	2·0		
	2·0		
	2·0	8 0	Do. add (average).
		209 11	
	8·3		
	11·9	96 11	6″ P. C. concrete under floor.
½/	4·0		
	2·0	4 0	Do. add.
	2·0		
	2·0	4 0	Do. add.
		104 11	

Drains.

4″	6″	Bends. 4″	Joints. 4″ off 4″	Joints. 4″ off 6″
70·0	48·0	4	3	1
20·0	18·0	4	1	
10·0				
43·0	58·0	8	4	
4·0				
147·0		Gulley with 4″ outlet.		Gulley with 6″ outlet.
	Taper 6″ to 4″.	4		1
	1	4		
		8		

147·0	147·0	4″ glazed stoneware pipe *a b*.
147·0	147·0	Dig for do. P. F. I. and R., and remove surplus.
147·0	147·0	6″ concrete laid to fall for 4″ drains.
58·0	58·0	6″ glazed stoneware pipe *a b*.
58·0	58·0	Dig for do. P. F. I. and R. *a b*.
58·0	58·0	6″ concrete to trench laid to fall for 6″ drain.
8	8	6″ gulleys with 4″ outlet.
1	1	Do. with 6″ do.
1	1	E. only to taper pipe 6″ to 4″
4	4	E. only to 4″ off 4″.
1	1	Do. 4″ off 6″.
8	8	Do. 4″ bends.

1	1	E. only to 6″ P. trap.
1	1	All labour and materials in digging for and forming inspection chamber in 9″ brickwork in cement faced with glazed bricks, and finished at bottom with cement floated surface, and having half glazed pipes, with all junctions, &c., and making good to inside of chamber, and having W. I. cover with patent air-tight joint, &c., complete, including intercepting syphon, 2 junctions of 6″ off 6″, and 1 of 4″ off 6″.
1	1	E. only to inspection syphon with cover, complete.

Ventilation.

3″ vent. pipe.	Bends.	Mica flap.
3·6	1	1
6·6		
10·0		
		Extract cowl
31·0	4	1
41·0	5	

14·0	14·0	4″ drain pipe.
1	1	Junction of 4″ off 4″.
41·0	41·0	3″ galvanised vent pipe.
5	5	E. O. to bends to do.
1	1	Mica flap inlet.
1	1	3″ extract cowl.
1	1	Make good through roof and flash round.

BRICKLAYER.

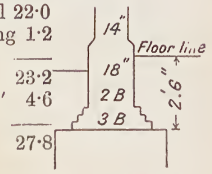
The bricks to be good, sound, hard stocks in mortar, laid to English bond.

The facings to be selected, best red kilns of Brown's or other approved make.

The mortar to be composed of 1 of blue lias to 3 of clean sharp sand.

$1\frac{1}{2}$ B. *walls with plinth both sides.*

N. wall 22·0
Projecting add 2/7″ = flooring 1·2
23·2
6/ 9″ 4·6
27·8



27·8 0·9	20	10
27·0 1·9	47	3
27·0 1·6	40	6

3 B. in foots in stock in mortar (N. wall of archway).

2 B. in wall to floor.

Damp proof course of 2 course of slates in C.

$1\frac{1}{2}$ B. *walls with plinth one side only.*

South wall 22·0
Foots at end 0·9
Piers 3/ 9″ = 2·3
South of stairs and projections 11·9
Bay 9·9
Projections 0·9
46·8

46·8 0·9	34	6
45·9 1·9	80	1
45·9 1·6	68	8

3 B. in foots in stock in mortar (South wall of archway).

2 B. in wall to floor.

D. P.C. as before.

$1\frac{1}{2}$ B. *walls without plinth.*

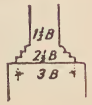
2 2/9′·0″ = 18·0
less 4/·7″ = 2·4

15·8
Add N. of yard 3·6

19·2

1 B. *walls with plinth*

7·6
18·6
10·0
7·6
43·6



19·2 0·9	10 0	$2\frac{1}{2}$ B. in foots.
43·6 0·9	32 8	$2\frac{1}{2}$ B. in do.
43·6 1·9	76 2	$1\frac{1}{2}$ B. in walls to floor.
43·6 1·2	50 9	D. P. C. as before.
20·0 2·0	40 0	$1\frac{1}{2}$ B. in wall *a b*.
20·0 1·2	23 4	D. P. C. *a b* to floor *level*.

1 B. *walls without plinth.*

4·0
9·0
3·3
11·0
6·6

33·9

	33·9 0·6	16·11	1½ B. in foots.
	33·9 2·0	67·6	1 B. wall.
	33·9 0·9	25·4	D. P. C. *a b.*
	7·6 ½/ 4·3 0·9	11·11	Cube brickwork in foots.
	½/ 7·6 4·0 1·9	26·3	Add do. in chy.
		38·2	
	½/ 7·6 1·9	6·7	D. P. C. (*completion to ground floor level*)

N. Wall of Entrance.

22·0
2/ 9″ = 1·6
23·6

	23·6 11·3	264·4	1½ B. in wall.
	22·0 8·0	176·0	1 B. do. add.
	¼/ 7·0 1·2	32·8	1 B. add buttress average.
		208·8	

22·0
2/6/9″ = 9·0
31·0
22·0
(see over), 53·0

	53 0		
	0·9	39 9	½ B. add in plinth.
2/	12·0		
	8·6	204 0	1 B. add for gables.
2/½/	8·0		
	12·0	96 0	Add gables.
	10·0		
	8·0	80 0	1 B. wall, add internal.
		380 0	
	6 0		
½/	2·6		
	8·0	60 0	Cube brickwork in chy.
	3·0		
	13·0	39 0	2 B. add in chy. stack.
	9·0		
	2·0	18 0	¼ B. in cap.
			Wall N. of S. Room
	11·0		
	11·3	123 9	1½ B. add in wall.
	11·0		
	8·0	88 0	1 B. add up to roof
3/	11·3		
	1·2	39 5	1 B. add piers gd.
		127 5	
2/	11·0		
	0·9	16 6	¼ B. add for plinth.
			Staircase.
	10·9		
	10·0	107 6	1½ B. wall.

	8·0 0·9	6·0	¼ B. add for plinth.
			2/ 6·6 = 13·0 2/ 11·3 = 22·6 35·6
	35·6 19·0	674·6	1½ B. add in wall.
	35·6 4·0	142·0	1 B. in top.
			Bay.
			9·6 2·0 2·0 13·6
	13·6 10·6	141·9	1½ B. add.
			Yard, &c.
			10·6 3·6 2/ 5·6 = 11·0 25·0
	25·0 7·6	187·6	1 B. add in wall.
	7·6 9·0	67·6	1½ add to 1st floor.
	7·0 12·0	84·0	1 B. add gable.
½/	12·0 8·0	48·0	1 B. add do.
	4·3 7·0	29·9	1 B. add return.

Internal.

	15·6		
	19·0	294 6	1 B. wall.
	8·6		
	8·0	68 0	1 B. add scully., &c., chy.
		524 3	
½/	3·3		
	9·0	14 8	4½ B.
½/	2·7½		
	9·0	11 10	3½ B. to 1st.
½/	4·6		
	4·6		
	10·0	101 3	Cube brick in breast avge.
	10·0		
	5·0	50 0	2½ B. in shaft.
	14·0		
	2·0	28 0	¼ B. in cap.
	5·6		
	8·6	46 9	1 B. add *circ.* on plan, radi. 4 feet.
	6·9		
	6·0	40 6	1 B. add N. of kitchen.
½/	11·0		
	9·0	49 6	1 B. add gable to do.
	9·6		
	7·0	66 6	1 B. add S. gable.
½/	9·6		
	5·6	26 2	1 B. add do.
	18·6		
	7·6	138 9.	1 B. add back wall.

½/	4·6 3·0	6·9	1 B. add do.
		328·1	
			¼ B. *project of plinth* :—
	5·6 0·9	4·2	¼ B. *circlr.* on plan.
			6·0 9·6 20·6 36·0
	36·0 0·9	27·0	¼ B. add, *not circlr.*
			Deductions.
2/	2·9 4·0	22·0	1½ B. ddt.
2/	4/	12·7	1½ B. ddt.
		34·7	
	8·0 2·9	22·0	1 B. ddt. door.
	8·3 3·6	28·11	½ B. ddt. do.
	2·10 6·10	19·4	1½ B. ddt. do.
	3·6 2·3	7·11	½ B ddt. window.
	4·3 2·6	10·8	1 B. do.
2/	2·6 6·6	32·6	1 B. ddt. door.
		43·2	
	2.6 4.6	11·3	½ B. ddt. window, *circlr*

	3·3 4·9	15 5	½ B. do. *do.*
		26 8	
	2·0 3·0	6 0	½ B. ddt. window and door
	5·9 4·9	27 4	½ B. ddt. do.
	3·9 2·0	7 6	½ B. ddt.
		40 10	
	6·6 5·0	32 6	½ B ddt.
	4·6 4·0	18 0	½ B. ddt.
	5·3 4·3	22 4	½ B. ddt.
		72 10	
	2·0 1·6	3 0	1 B. ddt.
2/	3·0 6·0	36 0	½ B. ddt.
2/	3·9 6·3	46 11	½ B. do.
2/	5·6 3·0	33 0	½ B. ddt. window to bay.
		115 11	
2/	5·9 3·9	43 2	1 B. ddt. do.
4/	1·6 3·6	21 0	1½ B. ddt. for fire opening

	2·6			
	4·9	11·11		1½ B. ddt. do.
				First floor
	8·6			
	2·6	21·3		1½ B. ddt. door.
	6·6			
	2·6	16·3		1½ B. ddt. do.
		70·5		
	6·6			
	2·6	16·3		1 B. ddt. do.
	3·6			
	5·6	19·3		1 B. ddt. window
	3·6			
	8·6	29·9		1 B. ddt. do.
		49·0		
	1·6			
	7·0	10·6		1½ B. ddt. window
	1·6			
	2·6	3·9		1½ B. ddt. do.
		14·3		
	4·0			
	4·0	16·0		1 B. ddt. do.
	5·0			
	5·0	25·0		1 B. ddt. do.
		41·0		
3/	1·0	3·0		Labour to forming tumbling in courses—14" on face.
	17·0		10·6	
	0·6	3·6	3·6	1½ in. foots of sleeper walls.
			3·0	
	17·0		17·0	
	1·3	21·3		1 B. in do.

Brick sills 3·6
2·9
4·0
3·0
3·0
1·6
17·9

E. O.

	17·9	17 9	Brick on edge sill 4½" on face and tile creasing.
	3·6	3 6	Do., but *circular*.
2/	4·0	8 0	E. O. to special 14" sill. double chfr. in brick.

9·0
4·6
22·0
5·0
2·0
42·6

	42·6	42 6	E. O. to beam filling to 1 B wall.

Rough cutting, 9" wide.

2/ 12·0 = 24·0
2/ 10·0 = 20·0
2/ 8·0 = 16·0
2/ 6·0 = 12·0
2/ 12·0 = 24·0
96·0

	96·0 0·9	72 0	Splayed cutting to brickwork.

Brick on edge.	Do. circlr.
3·6	4·6
6·6	5·6
5·0	10·0
15·0	

	15·0	15 0	E. O. to brick on edge cop. in cemt. and T.C.

			Plinth.	M.	S.E.
10·0	10·0	Do., do., but circular do.			
			22·4½	20	2
			22·4½	15	2
		12/ 9″ =	9·0	2	1
			19·4½	—	—
		5/ 9″ =	3·9	37	5
			0·4½		
			1·6	S. mitre.	
			2·0		
			2·0	2	
			2·0		
			8·0		22·4½
			2·0		3·0
			10·0		
			2·0	Do. to	19·4½
			6·0	Circlr.	
			17·6		
			9·3	2	
			139·6		
			3·0		
		3/ 1′ 6″	4·6		
			147·0		
			Do. circlr.		
			6·0		
147·0	147·0	E. O. to moulded plinth.			
6·0	6·0	Do., do., circlr.			
37	37	Mitres.			
5	5	S. ends to do.			
2	2	S. mitres.			
2	2	Do. to circlr.			
9·0					
6·6	58·6	6″ tile paving. (Hall).			
2·6					
1·0	2·6	Do., add.			

2·6 0·4½	0·11	Do., add.
	61·11	
9·0 6·6	58·6	6″ concrete and cement float
2·6 1·0	2·6	Add do.
	61·0	
6·6 5·6	35·9	6″ tile paving *a b* (yard).
6·6 5·6	35·9	6″ concrete and cement float
8·0 6·6	52·0	6″ tile paving *a b* (scullery).
2·6 0·9	1·11	Add do.
	53·11	
8·0 6·6	52·0	6″ concrete and cemt. float *a b*.
10·6 8·0	84·0	6″ concrete and cement float under wood block floor.
2·0 8 0	16·0	6″ tile paving *a b* (to seat).
3·0 9·0	27·0	6″ concrete average and cement float, do.
2/ 1	2	Use and waste of 4 feet centre (arches). 1½ B soffit.

			Facings.
2/2/	4·9 / 0·9	22 5	E. O. to semicir. arch in two rings in selected red bricks.
2/	4·0 / 1·2	14 8	Add do. soffit.
		37 1	
4/	5·6	34 6	E. O. to circlr. cut to facing.
	1	1	Use and waste of centre 8/6 semi-arch, and 2 feet deep.
	8·0 / 2·0	25 2	E. O. to semi-circ. arch *a b*.
	8·9 / 0·9	20 7	Add do. do.
		45 9	
	9·6	14 11	E. O. to circlr. cut. to facing.
			Bay.
2/	1	2	Turning pieces 4½″ soffit, 3 feet opening
2/	3·0 / 1·1½	6 9	E. O. to segmental arch *a b*.
2/	3·9	7 6	E. O. to circlr. cutting to facing.
2/2/	1·0 / 0·4½	1 6	Fair cut to skewback.

	1	1	Centre to 3·9 segmental arch, 4½" soffite.
	3·9		
	1·1½	4·3	E. O. to segmental arch *a b*.
	4·6	4·6	E. O. to circ. cutting to facing *a b*.
2/	1·0		
	0·4½	0·9	F. C. to skewbk.
	1	1	Turning piece 4½" soffit to 3 feet opening.
	1·6		
	0·9	1·2	E. O. to segl. arch *a b*.
	1·9	1·9	E. O. to cut to do.
2/	0·6		
	0·4½	0·4½	F. C. to skewback.
	1	1	Turning piece to segmental arch 2/6 opening 1½. B. soffit, *circlr.* on plan.
	2·6		
	0·9	1·11	E. O. to arch *a b*, but *circlr. on plan.*
	3·3	3·3	E. O. to cutting to facing, *circlr. on plan.*
2/	0·6		
	0·4½	0·4½	F. C. to skewback.
	1	1	Turning piece to 2·9 opening, 4½" soffit.
	2·9		
	1·1½	3·1	E. O. to arch *a b segmental.*
	3·6	3·6	E. O. to circular cutting to facing.
	1·0		
2/	0·4½	0·9	F. C. to skewback.

Rough Arches.

2/	1	2	2·9 opening 1 B. soffit.
2/2/	1	4	3·0 „ 1 B. „ windows and doors.
2/	1	2	2·9 „ ½ B. „ „ „
	1	1	3·6 „ 1 B. „ „ „
	1	1	5·6 „ 1 B. „ „ „
	1	1	4·0 „ ½ B. „ „ „
	1	1	1·6 „ ½ B. „ „ „
	1	1	2·6 „ 1 B. „ „ „
2/	1	2	2·6 „ 1½ B. „ „ „
	1	1	5·6 „ 1 B. „ „ „
	1	1	8·6 „ 1 B. „ „ „
	2	2	3·6 „ 1 B. „ „ „
	3·6		
	2·0	7·0	Trimmer arch ½ B. in cement.
2/	2·6		
	2·0	10·0	Add do.
		17·0	

Frames B. and P. in L. and hair :—

	Large do.
8	1
2	2
10	3

	10	10	F. B. and P. in L. and H.
	3	3	Large do. do.
	4	4	Air bricks fix.
	5	5	Chimney-pieces set.
	4	4	Stoves set.
	1	1	Range do.
	1	1	Copper set.
	1	1	Sink do.
2/	1	2	Build piers to sink 2′/3″ × 1′ 6″ × 4½″ in glazed bricks.
	1	1	Doulton's glazed sink 2/3 × 1/6
	4·0 2·6	10·0	E. O. over stock to facing of white glazed bricks.
	6	6	Flues parge and core.

Flashings wedge and P.:—

Cover.	Step.
18·0	21·0
16·6	2·6
27·0	20·6
11·6	11·0
22·6	
19·3	55·0
114·9	

1	1	Provide in the estimate the P.C. sum of 5*l.* for tile hearths, and add for labour and materials of laying, including cement float under.

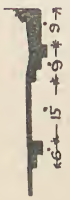
2/	22·0 11·6	506·0	Facing of selected red facing-bricks.		
2/6/	8·0 0·9	72·0	Add buttresses.		
		578·0			
2/2/	1·9 1·10	12·10	Ddt. facing.	3·0 1·2	4·0 2·3
				1·10	1·9
2/2/	1·9	2·10	Ddt. do.		
		15·8			
3/	1·2 1·6	5·3	Fair cutting to slope.		
	26·6 12·0	318·0	Facing *a b*.		
				2·10 0·9	8·0 0·4½
	2·1 7·7½	15·11	Ddt.	2·1	7·7½
	2·3 11·6	25·11	Facing add.		
	11·6 0·4½	4·4	Do.		
	3·6 2·6	8·9	Do.		
		39·0			9·3 0·9 1·0
	11·0 5·6	60·6	Do., but circlr. on *plan*.		11·0

					2·6 0·9	4·6 0.4½
	4·1½ 1·9	7	3	Ddt. do.	1·9	4·1½
	7·6 6·0	45	0	Facing *straight a b.*		
	5·0 2·0	10	0	Add do.		
½/	7·0 7·6	26	3	Add do.		
	20·0 7·6	150	0	Facing straight *a b*.		
		231	3			3·0 0·9
	2·3 7·6	16	11	Ddt. do. (door).		2·3
					3·0 0·4½	7·6 3·0
	2·7½ 4·6	11	10	Ddt. do. (window).	2·7½	4·6
		28	9			
				South.		
	8·6 7·6	63	9	Facing *a b.*		
½/	9·0 5·6	24	9	Add do.		
		88	6			
2/	4·0	8	0	E. O. to circlr. cut to facing.		
					4·0 0·9	4·0 0·9
	3·3 3·3	10	7	Ddt. do.	3·3	3·3

				3·3 7·6 5·6 9·0	8·6 0·9 1·0
	10·3				10·3
	31·9	325·5	Facing add *a b*.	25·3 6·6	
				31·9	
2/	5·0 2·0	20·0	Ddt.		
				2·6 0·9	6·6 0·4½
	6·1½ 1·9	21·5	Ddt. door.	1 9	6·1½
		41·5			6·6 2·3
	4·3 7·0	29·9	Add facing *a b*.		4·3
	7·6 11·6	86 3	Facing add *a b*.		
½/	3·0 2·0	3·0	Do. do. *a b*.		
	2·0 5·6	11·0	Do. do. *a b*.		
				9·6 2·6 2·6	
	14·6			14·6	
	12·3	177·8	Facing to bay add *a b*.		11·1 1·2
		277·11			12·3
4/	3·3	13·0	E. O. circular cut to facing.		
				5·0 0·9	3·0 0·9
2/	2·3 4·3	19·2	Ddt. facing.	4·3	2·3

			Stairs.
11·0			
6·6	71	6	Add facing *a b.*
8·0			
13·0	104	0	Add do.
1·6			
6·6	9	9	Add do.
	185	3	
6·6			
1·6	9	9	Ddt. do.
1·6			
2·6	3	9	Ddt. do.
	13	6	
			3·0
			4·0
			4·0
11·0	11	0	Circlr. cut to facing. 11·0
			11·6
			9·0
20·6			20·6
4·0	82	0	Add facing *a l to back.*
			Front.
11·6			
12·6	143	9	Facing *a b* add.
9·0	9	0	E. O. to circular cut to facing
11·6			
10·0	115	0	Facing *a b* add.
3·0			
2·0	6	0	Do. add.
	121	0	

2/2/	6·0	24 0	Circr. cut to facing.
			2/7′ = 14·0 2/10′ = 20·0
			34·0
	31·0		
	1·2	39·8	Add facing *a b*
	2·0		
	11·6	23·0	Add facing to pier.
		62·8	
			Chimneys.
			4 × 1·2 = 4·8 4 × 1·6 = 6·0
			10·8
	10·8		
	9·6	101 4	Facing to do.
			8 × 4½″ = 3·0
			13·8
	13·8		
	2·0	27·4	Add do.
		128·8	
	12·6	12·6	E. O. to labour to forming stack to plan.
	1	1	E. O. to labour to forming cap and necking to sketch.
			3 × 1·2 = 3·6 4 × 4½″ = 1·6
			5·0 5·0 2·8 2·8
			15·4
	15·4		
	9·0	138·0	Facing add to do. 8 × 4½″ = 3·0
			18·4
	18·4		
	2·0	38·8	Add do.
		176·8	



10·0	10·0	E. O. to labour to forming stack to plan
1	1	Do. to labour in forming cap and necking to sketch.
6	6	Chimney pots and fixing.

TILER.

The tiling to be best quality Broseley, laid to a 3½" gauge, each tile to be secured with 2 compo nails.

	15·0 26·0	390·0	Tiling as *a b*.
½/	5·6 5·6	15·2	Ddt. do.
2/	5·0	10·0	Valley tiles.
2/	5·0 1·0	10·0	Add for tiling cut to valley.
2/	7·0 0·6	7·0	Add for cutting.
		17·0	
2/	7·0	14·0	Labour to cutting round chimneys.
2/½	5·6 4·0	22·0	Add tiling to roof *a b*.

14·6
0·6
15·0

25·4
0·4
0·4
26·0

		Valleys.	
			12·6
			8·0
		2 × 9′ =	18·0
38·6	38·6	Valley tiles.	38·6
38·6			
1·0	38·6	Add for cutting to valleys.	
			3·8
			0·4
15·0			
4·0	60·0	Add tiling *a b*	4·0
			8·4
			0·4
8·6			
8·8	73·8	„ „	8·8
			13·0
			0·4
13·4			13·4
10·0	133·4	„ „	
8·8			
10·9	93·2		
			6·8
			0·4
12·6			7·0
7·0	87·6	„ „	
			12·0
			0·6
			12·6
			18·0
			0·4
18·4			18·4
12·0	220·0	„ „	
			13·8
			6·6
14·6			
14·2	205·5	„ „	14·2
	911·7		

2/	10·6 8·6	178·6	Add tiling *a b*.	
2/½	5·4 8·0	42·8	Add do.	
½/	8·0 9·6	38·0	Ddt. do.	
	5·6 4·0	22·0	Ddt. do.	
	24·0 0·6	12·0	Add tiling for splay cutting.	
	24·0	24·0	E. O. to cutting round angle chy.	
				4·3 0·6 4·9
2/	4·9 8·0	76·0	Add tiling to tower.	
½/	0·6 6·3	12·6	Add for cutting to hips.	
		88·6		
	1	1	Labour to making good to finial.	
			Ridge.	
				8·0 4·6 25·6 21·0 59·0
	59·0	59·0	Tile ridge. P.C. 1/6 per foot and fixing.	
				7·6 0·6 8·0
	23·0 8·0	184·0	Vertical tiling.	

			22·6 0·6 23·0
	23·0 6·0	138 0	E. O. to ornamental do. over plain.
			Gables.
2/	14·3 8·0	228·0	Add vertical tiling *a b*.
2/	14·3 6·0	171 0	E. O. to ornamental *a b*.
	3·6 5·6	19·3	Ddt. do.
2/	17·6 0·6	17·6	Add to tiling for cutting, &c.
	3·6 8·6	29·9	Ddt. do.
2/	24·0 0·6	24·0	Cut add to tiling
2/½	13·6 9·0	121·6	Vertical tiling add
2/2/	11·0 0.6	22·0	Add for cutting.
		167·6	
2/	1	2	Labour to forming opening in vertical tiling.
	5·6 1·6	8·3	Add vertl. tiling *a b*.
½/	5·6 4·0	11·0	Add do. gable.

2/	4·9 0·6	4·9	Add for cutting to do.
			South Gable.
	12·6 6·0	75·0	Add vertical tiling *a b*.
		99·0	
	12·6 4·0	50·0	E. O. to ornamental do.
	4·0 4·0	16·0	Ddt. do.
			(return).
	5·0 6·0	30·0	Add tiling.
	5·0 4·0	20 0	Add E. O. to ornamental tiling.
	16·0 0·6	8·0	Add cutting to opening.
½/	12·6 8·0	50·0	Add vertical tiling in gable.
2/	10·0 0·6	10·0	Add cutting to gable.
½/	4·0 7·0	14·0	Vertical tiling add.
		82·0	
			Angles.
			6·0 6·0 8·0 8·0 28·0
	28·0	28·0	Special angle tiles to vert. tiling.

28·0 0·6		14	0	Add for cutting to do.
2·0 8·0		16	0	Vertical tiling add.
2·0 6·0		12	0	E. O. to ornamental tiling over plain.

Pointing to Verge.

2/ 14·3 = 28·6
2/ 2·0 = 4·0
2/ 14·3 = 28·6
16·0 = 16·0
2/ 7·9 = 15·6
2/ 10·0 = 20·0
2/ 12·0 = 24·0

136·6

136·6		136	6	Cement point to verges.

Cutting to Foot of Rafters.

2·0
5·0
6·0
22·0

35·0

35·0		35	0	Cutting of vert. T. for feet of rafters.

MASON.

The stonework to be the best of its several kinds, free from all imperfections, and to be laid on its natural bed.

3·4½
3·3
3·3
3·3

13·1½

13·2		13	2	Portland stone sill 10″ × 4″, tooled on 3 faces.

4/	2	8	Ends of sills c. and p.
4/	2	8	Mortises in sills.
2/	1	2	Spur stones 2′6′ × 9″ × 14″ with rounded top.
4/	1	4	Stone corbels.
2/	11·6	23·0	Portland stone sill, 6″ × 14″ tooled on 3 faces and end.
2/2/	1	4	9″ × 14″ × 6″ tooled Portland template, including all sinkings for gate hinges and fixing.
			Provide the P.C. sum of £18 for 5 mantels, including kitchen mantel.
3/	1·4 1·4 0·6	2·8	Cube stone (Bath stone, box ground).
			1·2 1·2 2.4
3/	2·4 0·6	3·6	½ saw to do.
			2·8 2·8 5·4 2·4 3·0
3/2/	1·2 1·2	8·2	Do. beds.
		11·8	
3/	3·0 0·6	4·6	P. F.

3/2/	0·2 2·6	2·6	Add P. F. top and bottom.
		7·0	
	1·2 1·2 0·6	0·8	Cube stone.
	2·0 0·6	1·0	½ saw.
	1·0 1·0	1·0	Do. beds.
		2·0	
	2·4 0·6	1·2	F. F.
	0·2 2·2	0·4	F. F. add.
		1·6	
			Windou
11/	0·9 0·9 0·9	4·8	Cube stone.
11/	0·9 0·9 0·4½	2·4	Add do.
	4·6 0·9 0·6	1·8	Add do. head.
2/	2·6 0·9 0·6	1·11	Add do. sill.
2/	2·6 0·6 0·6	·3	Do. T. and M.
		11·10	

2/11/	0·9 0·9	12·5	Plain beds.
11/	1·6 0·9	12·5	½ saw.
11/	0·9	8·3	Labour to forming double chfrd. (jamb)
11/	0·9 0·4½	3·1	Plain beds.
11/	1·6 0·9	12·5	½ saw.
11/	0·9	8·3	Labour to forming double chfrd. (jamb)
	4·6 1·3	5·8	½ saw.
	4·6 0·9	3·5	P. F.
	3·6	3·6	Labour to forming head.
	2	2	E. O. to labour of mitred angles.
	1	1	Do. of junction of mullion with head.
	2	2	Slate dowels.
	2·6	2·6	E. O. to labour in forming mullion.
	2·0	2·0	Do. do. in transome.
2/	2·0	4·0	Do. do. in sill.

2/	2	4	E. O. to mitred intersection of jamb and M. to sill.
2/	1	2	E. O. to M. intersection of jamb to transome.

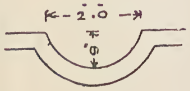
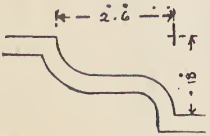
Portland Stone Coping.

4·0
9·6
2·0 add girth.

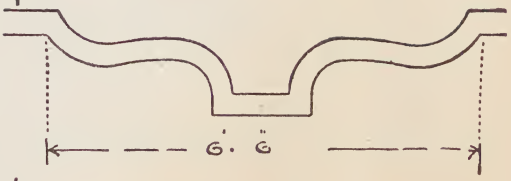
15·6
3·3
13·6

32·3
21·6
25·0

78·9

	78·9	78·9	Portland coping 6″ × 14″ thick, twice throated and weathered to rear.
2/	1	2	E. O. to mitred angles of coping.
2/	1	2	E. O. to labour in forming 
2/	1	2	E. O. to labour in forming ramp thus 
	1	1	E. O. to labour in forming
	1	1	E. O. to labour of M. angle.
4/	1	4	E. O. to M. angle.

1 | 1 | E. O. to forming



1 | 1 | Do. do., but 9′ 6″ do.

Attend upon all trades, &c.

CARPENTER AND JOINER.

The timber to be the best Memel, Riga or Dantzic, free from all defects.

Lintels (Collection.)

$9 \times 4\frac{1}{2}$	$4\frac{1}{2} \times 4\frac{1}{2}$	$12 \times 4\frac{1}{2}$ Do. lintels cir
5·0 W.	4·6	4·0
4·6 D.	4·6 } D.	
4·6 W. } Bay.	4·6	
4·6 W.	9·0 D.	
18·6	9·0 D.	
	4·6 D.	
	4·6 D.	
	7·0 D. and W.	
7·0 W.	5·6 W. Scullery.	
5·6 W.	3·0 W. C.	
5·0 W.	56·0	
10·6 W.	13·6 D.	
7·0 opening.	9·0 D.	
53·6	78·6	

53·6
0·9
0·4½ | 15·7 | Fir in lintels.

	78·6		
	0·4½		
	0·4½	11 0	Add do.
		26 7	
	4·0		
	1·0		
	0·4½	1 6	Do., but *circular* on plan.

Patent Fixing Blocks (Wright's).

	Doors (6).	W. (6).	W. (4).
	6 Gd.	4	1
	4 Ist.	4	1
			1
	10	8	3

6/	18	10 8	Patent fixing blocks.
4/	3	12	Do.
4/	11	4 4	Do.
		15 4	

Plates.

	46·6		
	0·4½		
	0·3	4 4	Fir in plates.
9/	14·0		
	0·5½		
	0·2¼	10 10	Do. in G. F. J.
2/3/½	3·6		
	0·5½		
	0·2¼	0 11	Add do.
		11 9	
3/½	3·6		(*Deductn.* for hearth.)
	0·5½		
	0·2¼	0 5	Fir in G. F. J.
		11 4	
3/½	4·0		
	0·5½		
	0·2¼	6	Fir in G. F. J., add.

11·6
10·0
7·0
4·0
7·0
3·6
3·6
46·6

1st Floor.

12/	11·3		
	0·7		
	0·2½	16 5	Fir framed in joists.
½/½	4·0		
	0·7		
	0·2½	0·11⅔	Ddt. do.
		15 5	
	9·0		
	0·7		
	0·3½	1 6	Add trimmer.
	6·0		
	0·7		
	0·2½	0 8¾	Add filling in.
5/	7·6		
	0·7		
	0·2½	4 6	Add joists under cupd.
		22 2	
	26·0		
	0·4½		
	0·3	2 5	Fir in plates.
			21·0
			7·0
			7·0
			35·0
	35·0		
	0·4½		
	0·3	3 3	Do. do.
		5 8	
	35·0	35 0	Labour to forming mouldd. plate, 6″ × 3″.
	35·0		
	0·6		
	0·3	4 5	Fir in plate.
19/	12·9		
	0·9		
	0·2	30 1	Fir in J.

9/½	4·6		
	0·9		
	0·2	2 6	Ddt. do.
		27 7	
2/	7·3		
	0·9		
	0·3	2 9	Add fir in trimmer.
		30 4	
19/	1·8		
	12·9	403 9	Labour to plang. on fir.
9/½	1·8		
	4·6	33 9	Ddt. do.
2/	1·9		
	7·3	25 5	Add planing.
19/2	10·0	380 0	Chfd. on fir.
2/2	5·3	21 0	Add do.
9/½	3·6	15 9	Ddt. do.
		416 9	
21/	4	84 0	Stops to chfr.
	35·0		
	0·4½		
	0·3	3·3	Fir in plate.
8/	7·6		
	0·7		
	0·2	5·10	Fir in joists.

9
9
2
—
20

plates

7·6
7·6
20·0
—
35·0

2/	7·6 0·7 0·1	0 8¾	Add trimmer.
		6 7	

Main Roof.

Plate.	Ddt.
25·0	6·0
25·0	
4·0	
16·6	
16·6	
16·0	
20·0	
13·0	
8·0	
144·0	
6·0	
138·0	

	138·0 0·4½ 0·3	12 11	Fir in plate
24/	13·6 0·4½ 0·2	20 3	Fir in rafters.
4/	4·0 0·4½ 0·2	1 0	Ddt. do.
		19·3	
2/	5·0 0·4½ 0·3	0 11½	Add trimmer.
2/	13·6 0·4½ 0·1	0 10	Do. do.
	11·0 0·4½ 0·3	1 0	Do. framing (rear of chy.).
		22 0¼	

Bt. forward		22	0½
3/2	5·0		
	0·4½		
	0·2	1	10½ Add rafter.
24/	11·0		
	0·4½		
	0·2	16	6 Do. do.
6/	2·6		
	0·4½		
	0·2	0	11¼ Do. do. feet of do.
11/	9·0		
	0·4½		
	0·2	6	2 Add rafter.
		47	6
6/	12·0		
	0·4½		
	0·2	4	6 Do.
17/	12·0		
	0·4½		
	0·2	12	9 Add do. (*Trimming = filling in*)
14/	16·6		
	0·4½		
	0·2	14	5 Add fir in rafter.
	62·0		
	0·9		
	0·2	7	9 Ridge.
	48·6		
	0·9		
	0·2	6	1 Valley.
4/	7·0		
	0·9		
	0·2	3	6 Hips.
		49	0

2
4
6

Bt. forward		49·0	
8/2	10·0		
	0·4½		
	0·2	10·0	Add fir in rattr.
		59·0	

7 × 3

15 6
21·0

36·6

	36·6		
	0·7		
	0·3	5·4	Add tie to collars.
12/	11·6		
	0·4		
	0·2	7·8	Add collars.
20/	13·6		
	0·4		
	0·2	15·0	Do. do.
10/	6·6		
	0·4		
	0·2	3·7	Struts add.
14/	7·0		
	0·4		
	0·2	5·5	Add collars to K. roof.
2/9	6·6		
	0·4½		
	0·2	7·4	Rafters to tower roof.
		44·4	
	1·6		
	9·6	14·3	Firrings and ¾″ board laid for flat in small pieces.
1·3/	1	4	E. O. to labour in forming cesspool head, &c.
2/4/½	3·6		
	0·4		
	0·2	0 9⅓	Rafters to flat in small pieces.

2/½	3·6 2·0	⅞·6	Firrings *a b* for flat.
3/	3·0 0·5 0·2	0·7½	Joists to flat.
½/	3·0 3·0	4·6	¾″ board and firrgs. for flat *a b*.
	1	1	E. O. to cesspool head *a b*.
6/	3·6 0·5 0·2	1·5½	Fir in joists to flat.
	6·0 3·0	18·0	¾″ board and firrings for flat *a b*
	4·0	4·0	Roll to flat.
	3·6	3·6	Drip to do.
	9·0 1·3	11·3	¾″ gutter boards and bearers.
	11·0 1·6	16·6	Add do.
2/	14·0 1·0	28·0	Add do.
		55·9	
2/	1·0	2·0	E. O. to cesspool outlets
4/	1·0	4·0	Rebated drip.
	1·6	1·6	Add do.
		5·6	

	14·6		
	25·4	367·4	¾" boarding to roof, and battens.
	5·6		
	5·6	30·3	Ddt.
		337·1	
2/½	5·3		
	3·6	18·5	Add ¾" bd. *a b*.
	15·0		
	3·8	55·0	Do.
	8·6		
	8·4	70·10	Do.
	13·0		
	10·0	130·0	Do.
	10·9		
	8·4	89·7	Do.
	12·6		
	6·8	83·4	Do.
	18·0		
	12·0	216·0	Do.
	14·6		
	13·8	198·2	Do
2/	10·0		
	8·6	170·0	Do.
		1168·5	
	5·0		
	4·0	20·0	Ddt.
½/	8·0		
	9·6	38·0	Ddt.

2/½	5·0 8·0	40·0	Add ¾″ bd. *a b.*
2/	4·4 8·0	69·4	Add do. to tower.
		109·4	

Cutting

10·0
7·0
38·6
24·0
25·0
104·6

	104·6 0·6	52·3	Add for cutting to boarding.

(*Tilt Fillet*) *Roof*:—	*Do. Vertical*:—
25·0	21·6
1·6	16·0
2·6	14·0
10·6	6·6
1·6	13·0
3·6	16·0
8·6	4·6
11·0	
6·6	91·6
7·0	
6·0	
83·6	

	83·6	83·6	Tilt fillet to roof.
	91·6	91·6	Do. to vertical tiling.
			(Battens for vertical tiling from Slater.)

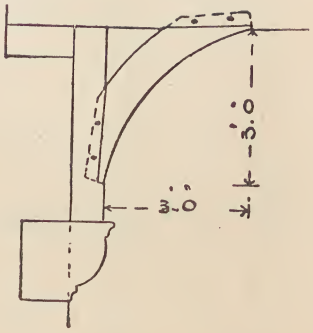
Barge Boards

2/2	14·0 1·2	65·4	2¼″ × 12″ deal wrot. and double chfd. barge board.
2/2	14·0	56·0	3″ × 3½″ moulded verge mould.

2/2	1	4	E. O. to cut ends to B. Bd.
2/	1	2	E. O. to mitred top to do.
2/2	1·6 1·3	7·6	E. O. to planing to fir plates.
2/	1·6 1·8	5·0	Do. to ridge.
2/2	14·0 1·0	56·0	Do. to rafters.
		68·6	
2/	2	4	E. O. to housings of plate to B. B.
2/	1	2	Do. ridge to do.
2/	7·6 1·2	17·6	2¼ B. bd. *a b*.
2/	7·6	15·0	3″ × 3½″ mouldd. verge mould.
3/	1·6 1·1	4·11	E. O. to planing on fir.
3/2/	1·6 1·0	9·0	E. O. to planing on fir.
2/	7·6 1·0	15·0	Do. to rafters.
		28·11	
3/2/	1	6	Housing of plate to B. board.
3/	1	3	Do. to ridge.
3/	1	3	Mitre to do.

3/	2		6	Mitred ends to B. bd.
				10·0
	41·6			6·0
	1·2	48	·3	2¼ B. bd. *a b.* 15·6
				12·0
				41·6
	41·6	41	·6	3″ × 3½″ moulded verge.
	41·6			
	1·0	41	·6	E. O. to planing on fir.
	16·0			
	1·2	18	·8	2¼ barge board *a b.*
	16·0	16	·0	3½ × 3″ moulded verge *a b.*
2/	1·6			
	1·0	3	·0	Planing on fir.
	16·0			
	1·0	16	·0	Add do. to rafter.
	2		2	Housings of plate into B. bd.
	1		1	Do. ridge to do.
	1		1	Cut end to do.
				Cut Ends to Rafters.
				24
				3
				3
				10
				6
				6
				4
				56
	56	56		E. O. to labour in forming C. ends to rafters.

2/	12·0 1·0 0·9	18·0	In beams rivd. and boltd.
2/5/	1	10	Bolts 11″ to heads.
2/	12·0 2·9	66·0	Planing on do.
2/	14·0 0·9 0·6	10·6	Fir framed in truss.
2/2/	1	4	E. O. to labour in forming truss.
2/	12·0	24·0	Rough bracketing to R. I. J. 10″ deep.
	12·0 2·9	33·0	1¼″ deal W. double bd., and tgd. lining to girder.
	33·0 0·4 0·3	2·9	H. and C.
	52·0 0·4 0·4	5·9 8·6	D. P.



Q. P.

4 × 4.

4 × 7·6 = 30·0
4 × 5·6 = 22·0

4 × 2.

6 × 5·6 = 33·0

4 × 3.

11·0
11·0
7·0
4·0

33·0

Bt. forward		8·6	
	33·0		
	0·4		
	0·2	1·10	Studs.
		10·4	
			JOINER AND IRONMONGER
	11·0		
	8·3	90·9	3″ wood block paving.
	5·0		
½/	3·0	7·6	Ddt.
	1·6		
	1·0	1·6	Ddt. do.
		9·0	
	9·3		
	0·6	4·8	Add to 3″ wood block for cutting.
	7·3	7·3	3″ mitred margin.
	20·6		
	11·0	225·6	3″ wood block floor.
	1·6		
4/	0·9	4·6	Ddt. do.
		221·0	
	20·6		
	11·0	225·6	6″ concrete *a b* under floor
	1·6		
4/	0·9	4·6	Ddt. do.
		221·0	
	10·0		
	14·0	140·0	1½″ yellow deal floor in batten widths, tongued, iron tongues.
	4·6		
2/½	3·0	13·6	Add do.

	4·0			
	2·6	10·0	Add do. average.	
	2·8			
	0·9	2·0	Add do.	
		165·6		
½/	3·0			
	3·0	4·6	Ddt. do.	
		161·0		20·3
				0·9
	12·0			
	19·6	234·0	1″ floor straight joint laid folding.	19·6
½/	6·0			
	3·0	9·0	Ddt. do.	
		225·0		
	10·6			
	0·4½	3·11	Add flooring *a b* for cutting.	
		228·11		
		229·0	1″ deal wrot. and V-jointed boarding for staining.	
	10·0			
	14·6	145·0	Flooring *a b*.	
	5·0			
	3·0	15·0	Add do.	
		160·0		
½/	5·0			
	7·0	17·6	Ddt. do.	
				5·0
				3·4
				3·4
				11·8
				3·4
				3·6
	18·6			18·6
	0·4½	3·11	Add floor 1″ for cutting.	

18·6	18 6	2″ C. and M. margin to 1ª.
6·10	6 10	Do. to 1¼″
9·9		
7·3	70 8	1″ floor add *a b* (to tower).
2·0		
2·0	4 0	Ddt. do.
	66 8	

Skirtings.

1¼″ × 10″ moulded.

	M.	R. E.
10·0		
1·0	—	—
3·6	3	6
0·6	—	
4·0		
4·0		
3·0	do. irreg.	
7·0		
4·0		4
6·6		
1·0		
	dr. to cir.	
44·6		6
do. circ.		
3·6		
circlr. angle.		
2		

12·0
7·0
6·6
2·0
1·6
5·0
34·0
0·6
1·6
1·6
0·6
1·0
39·0
6·6
0·9
10·6
12·0
8·0
2·0
78·9
10·6
10·0
2·9
2·9
2·0
2·0
6·0
8·0
3·6
126·3

1¼″ × 7″ torus.

M.	R. E.
—	—
4	4
3	6
3	4
5	8
—	—
15	22
irreg. M.	
4	
2	
2	
2	
—	
10	

44·6	44 6	$1\frac{1}{4}''$ × 10″ with proper grounds.
3·6	3 6	Do. do., but *circular*.
2	2	E. O. to small cir. angles,
3	3	Do. to M.
6	6	Do. to M. and R. E.
4	4	Do. to irregular M.
6	6	Do. to M. of straight to *circular*.
126·3	126·3	$1\frac{1}{4}''$ × 7″ torus.
15	15	E. O. to M.
22	22	E. O. to M. and R. E.
10	10	E. O. to irregular M.
19·0 1·0	19·0	1″ W. and bd. casing to pipes.
5·0 6·6	32·6	$\frac{3}{4}''$ wrought matchbd. casing to cistern, including all blocking pieces, &c.
4·0 6·6	26·0	Add do. as cover in pieces and ledged.
	58·6	
1	1	Pair of 12″ T-hinges.
1	1	Button.

Doors (Internal).

3/	2·8 6·8	53·4	1¾″ deal W. 4 P. and M. B. S. door.
3/	1	3	Pairs of 3″ butts.
			2/ 6·8 = 13·4 2·8 4/ 1¼ = 0·5 16·5
	16·5 0·6	8·3	1¼″ deal W. and rd. linings.
	16·5 0·11	15·1	Do. double rebt. and bd. linings.
	16·5 1·4	21·11	Do. and panelled bead butt.
3/	1	3	6″ mortise locks and selected china furniture.
3/	1	3	Pr. 3″ butts.
	2·8 6·8	17·9	1¾″ door *a b*.
	2·6 6·6	16·3	1¾″ door 4 P. S.
	2·6 6·6	16·3	1¾″ door 4 M. O. S. and S. O.
			2/ 6·6 = 13·0 2·6 4 × 1¼ 0·5 16·0
2/	16·0 0·11	29·4	1¼″ doub. reb. j. l. and backings.
	16·6 1·4	22·0	1¼″ do. wrt. dble. rebtd. and bd. linings.
		51·4	

2/ | 1 | | 2 | 6″ mortise locks *a b*.

1		1	6″ rim lock and brass furniture.

			¾″ × 3″ Grounds.	3″ × 1″ Archt.	Chfd. 2½×1	M.
			2/3 × 16·5 = 98·6	98·6	M. 16·4	
			2/3 × 0·4 = 2·0	2·0	— 16·4	6
			2/3×0·6	=3·0	12 16·4	
			100·6	103·6	49·0	6
				17·4	2	
			Extl. doors.	34 8	4	
			18·8	18·8	—	
			0·8	1·0	18	
				0·8		
			119·10	175·10		

119·10	119	10	¾″ × 3″ wrot. grounds.
175·10	175	10	1″ × 3″ archt.
18		18	M. to do.
49·0	49	0	1″ × 2½″ chfd.
6		6	M. to do.

F. Door.

26·0			
0·5			
0·4	3	7	D. W. rbdd. M. frame and transome.
6·8			
2·8	17	9	2″ 4 P. M. O. S., and bead flush other (9″ *reveal*).
1		1	Pair of 3½″ butts.
2		2	10″ barrel bolts.

	1	1	Night latch P. C. 15/ complete.
	1	1	Knocker P. C. 5/.
	1	1	Knob do. 2/6.
	2·8 2·0	5·4	2″ fanlight fixed.
2/	2·6 6·6	32·6	1¾″ ledged and braced door.
			2/ 6·4 = 13·8 4·0 17·8
3/	17·8 0·5 0·4	7·4	Deal W. rebtd. and chfd. frame.
2/	1	2	Pair of 12″ T-hinges.
2/	1	2	Norfolk latch, 8″.
	1	2	6″ bolt barrel.
3/	1	3	10″ do.
4/	1	4	Iron shoes to solid frames.
	2·6 6·6	16·3	2″ 3 P. door, 2 panels high. upper glazed in 20 squares.
	1	1	Pair 3″ butts.
	1	1	6″ rim lock and brass furniture.
	18·6 0·4½ 0·4	2·4	Rebtd. and chafd. door frame.

	18·6 0·11	18	6	1¼″ R. and B. linings.
	19·2	19	2	¾″ grounds.
	20·2	20	2	3″ architraves.
2/	1		2	M. to do.
2/	1		2	Pair of 3″ butts.
	5·6 4·9	26	2	1½″ 2 panel high, hung folding *M. O. S.*
	1		1	Cupbd. lock.
2/	1		2	4″ bolts.
2/	1·6 5·6	16	6	Cross T and glued shelves.
4/	1·6	6	0	¾″ × 2″ wrot. and chfd. fillet.
2/	1		2	12″ × 14″ W. I. brackets and fixing.
				Gates.
	6·0 10·3	61	6	2½″ deal W. and P. gates, panels filled in with 1¼″ beadd. and tongd. boardg., hung foldg.
	10·9	10	9	E. O. to moulded capping.
2/	1		2	Labour to forming ramp to do.
2/	1		2	Pair of 3′ 6″ strap gate hinges and fixing.

1	1		Approved stop to gates.
1	1		Do. drop handle and latch, P. C. 7/6.
2	2		12″ barrel bolts.
1	1		Mortise in *Portland Cill.*

Sashes.

2/ 2·6 = 5·0
3·6
3/ 2·9 = 8·3
16·9 Porch.

Cill.
4·0 Porch.
2/3·9 = 7·6 Bay.
4·9 Scul.
2·0 W.C.
3·3
21·6

5·9
3·9
4·6
2/ 14·0 = 28·0 Bay.
3/ 4·3 = 12·9 } Scul.
4·9 }
5·9 W.C.
2/ 4·6 = 9·0
3·4
3·9 16·1 K.
84·1

84·1 0·4½ 0·4	9	9	F. in W. R. and chfd. in cast frames and T.
21·6 0·7 0·3½	3	8	Oak sunk weatd. and throtd. cill.
15·6 0·4½ 0·4	1	11	F. in W. R. and chfd. cast frame measured *nett* circlr. on plan.
2·9	2	9	Oak in cill *a b*, but *circlr.* measd. nett.

				6/ 3·6 = 21·0
				9·6
			Cill.	30·6
			9·3	3/ 4·4 = 13·0
			4·3	4·3
			5·6	47·9
			19·0	4/ 3·6 = 14·0
				6·3
	68·0			68·0
	0·4½			
	0·3½	7·5	Double chfd. and rebtd. cast. frame.	
	19·0			
	0·8			
	0·3½	3·8	Oak in sill *a b straight*, but mouldd. on edge.	
3/	2	6	E. O. to M. and rebtd. ends to cill.	
	16·0	16·0	1″ wrot. *linings* rebated and beadd 7″ wide.	
	9·0	9·0	1¼″ × 9″ rounded W. bd.	
2/2/	1	4	M. and R. E. to do.	
	17·0	17·0	3″ architrave (no grounds).	
	13·0	13·0	1″ linings *a b*.	
	4·6	4·6	1¼″ × 9″ rd. W. bd. *a b*.	
2/	14·0	28·0	3″ architrave.	
	13·0	13·0	1″ wrot. linings rebated and beadd.	
	6·0	6·0	1¼″ × 9″ rd. W. bd. *a b*.	
	2	2	M. and retd. ends to cill.	

2/	3	6	Mitres to archtr.
			All sashes in very small squares.
2/	1·6 3·3	9·9	2″ mo. in small sizes.
3/	1	3	Pair of 2½″ butts.
3/	1	3	Do. do. cast. fasteners.
3/	1·6 3·3	14·8	2″ mo. cast. hung.
	1·6 3·3	4·10	2″ sash *a b* fixed.
2/	1·6 3·3	9·9	Do. do. hung.
2/	1	2	Pairs of 2½″ butts.
2/	1	2	Cast. fastr.
2/	4·0 1·6	12·0	2″ sash hung *a b*.
2/	1	2	Pair of 2½″ butts.
2/	1	2	Cast. fastg.
			Ground.
2/	3·0 2·0	12·0	Fixed 2″ sash *a b* } bay.
2/	3·0 3·0	18·0	Hung do. }

		18 0	Bt. forward.
2/	4·3		
	1·8	14 2	Add do. (scully.)
		32 2	
4/	1	4	Pair of 2½" butts.
4/	1	4	Cast. fastenings *a b*.
	3·3		
	2·3	7 4	2" hung casements *a b*.
2/	1	2	Cast. fastening *a b*.
2/	1	2	Pair of 2½" butts.
	2·6		
	2·9	6 11	Hung sash.
	1·9		
	2·9	4 10	Do.
		11 9	
4/	1	4	Pair of 2½" butts.
	2	2	Fastening to casements *a b*.
	2	2	Stay bars to transom lights.
	17	17	Special stay bars.
	4·6		
	2·6	11 3	2' casement *a b*, hung but *circlr*. on plan.
2/	1	2	Pair of 2½" butts
2/	1	2	Casement stays.

	1·6 1·3	1 11	2″ casement sash, hung *a b*, square.
	1	1	Pair of 2½″ butts.
	1	1	Stay bar.
2·1/	1	3	Approved cast. fastening
	6·2	6 2	2½″ angle mould scribed to wall.
	2	2	M. to do.
	13·0	13 0	3½″ do. do.
	2	2	M. to do.
	4·6	4 6	1¼″ × 9″ W. bd.
	2	2	Roundd. retd. ends.
	18·6	18 6	1″ × 2½″ chafd. archt.
	2	2	M. to do.
	2·6	2 6	1¼″ × 9″ W. Bd. *a b*.
2/	18·0	36 0	1″ × 7″ wrot. rebt. and bead. lining *a b*.
2/	3·6	7 0	1¼″ × 9″ Wrot. W. Bd. *a b*.
2/	2	4	M. and retd. ends.
2/	18·9	37 6	Wrot. and splayed grounds.
2/	19·9	39 6	3″ archt. *a b*.

4/	1	4	M. to do.
	2·6	2·6	1¼″ × 9″ W. W. Bd. *circlr.* on plan.
	11·6	11·6	1″ × 6″ wrot. rebtd. and beadd. lining *a b*, but *circlr.*
	12·2	12·2	Grounds to do. *circlr.*
	13·2	13·2	3″ architrave do.
			3·9 2·6 2·6 8·9
	8·9	8·9	1″ × 7″ W. rebtd. and bead. lining *a b.*
	3·9	3·9	1¼″ × 9″ rebated and roundd. to board.
	2	2	M. and R. E.
	9·5	9·5	¾″ grounds to do.
	10·5	10·5	3″ archt. *a b.*
	2	2	E. O. to M.
			Staircase.
	1	1	Step ladder 8′ 6″ long and fitted with iron hook at end and staples to floor.
	2·0 2·0	5·0	1″ wrot. and hinged trap door.
	1	1	Pair of 12″ T-hinges.
	1	1	6″ barrel bolt.
	9·6 0·9	7·1	1½″ beadd. and rebatd. lining.

2/	2·6 0·4½ 0·3	0 5⅔	Fir in plate.
3/	6·6 0·7 0·2	1 10	Do. in joists.
4/	4·0 0·7 0·2	1 7	Do. in landing.
	3·6 0·7 0·3	0 6	Trimmer in do.
		3 11	
	3·0 3·0	9 0	Floorboard in landing.
	7·0 2·0	14 0	Add do.
9/	2·6 1·6	33 9	1¼" treads and 1" riser on proper fir bearers and glue blocked and bracketed. Riser ·7½ 15) 108 (7⅕ Tread ·10 105 17½ 3/15
2/	2·6 0·7½	3 2	Add riser.
		36 11	
2/	2·9 2·9	7 7	Feather edge tongued winders.
2/	5·4 0·7½	6 8	Add risers.
		14 3	
	2·6 2·6	6 3	Tongued and glued quarter space (landing).

2/	2·6 1·6	7·6	1¼" T. and 1" R. &c.
	2·6 0·6	1·3	1" riser.
		8·9	
	30·3	30·3	1½" flush beadd. W. string.
			2·6 10·6 9·9 3/ 2·6 = 7·6 30·3
	13·0	13·0	Ramp to do.
	11·6	11·6	1¾" outer string.
	16·6	16·6	2" × 3" moulded capping.
6/	4·6	27·0	4½" × 4½" mouldd. and turned newel.
6/	1	6	E. O. to turnings
6/	1	6	Moulded heads.
6/	1	6	Do. drops.
2/	11	22	Housings T. and R. to string.
	1	1	Do. W. to string.
	1	1	Do. Q. space to string.

	1		1	Do. do. to newel.	
	6		6	Do. W. to newel.	
	5·0 1·0		5 0	¾″ beadd. lining.	5·0 2·6 2·6 2·6
	12·6		12 6	E. O. to forming nosing on floor.	12·6
	16·6		16 6	2½″ × 3″ mouldd. handl.	
	8·0		8 0	9″ skirt to match string.	
2/15	2·9		82 6	1″ × 1″ square bar ballrs. and fixing.	
15/	2		30	Fix ballusters.	
½′	7·6 5·6		20 8	1¾″ framed spandril 3 panels high M. O. S.	
	1		1	E. O. to labour in forming door in do.	
	1		1	Pair of 3″ butts.	
	1		1	6″ rim lock.	
	5·0		5·0	¾″ × 9″ mouldd. skirt.	
	2		2	S. and R. ends to do.	

SMITH AND FOUNDER.

	13·6	13 6	5″ × 8″ R. I. J., with ½″ top plate weight—*per foot.*
	5	5	Drilling to R. I. J.
	5	5	9″ bolts.
2/	6·0	12 0	5″ × 8″ R. I. J. *a b.*
3/	1	3	Drilling to R. I. J.
	3	3	9″ bolts.
	1	1	Hard York tooled temp. 14″ × 14″ × 3″.
2/	1	2	Do. with rounded corners to do.
	1	1	E. O. to labour in connecting two 8″ × 5″ and top plate.
	1	1	Angle plate 7″ long and drillg. and bolts (4).
	25·6	25 6	3″ rough core, including joints and bedding in cement.
2/	25·6	51 0	E. O. to tooled edge.

Chy. Bar.

2·9
1·6
2·0
1·6
3/ 1·6 = 4·6
3/ 0·9″ = 2·3

14·6

	14·6	14 6	½″ × 2″ chy. bar with split ends.

	4	4	W. I. air bricks 9″ × 4½″.
	1	1	Provide in the estimate the P. C. sum of for stoves and range, and add for carriage and fix.
	1	1	Set of copper bars and furnace complete.
	1	1	12 gall. G. I. copper.
2/	1	2	Provide in the estimate the P. C. sum of 1*l.* 5*s.* each, exclusive of carriage and fixing for finials.
	1	1	Provide and fix, including hoisting, a G. I. tank, 6/ × 3/ × 4/.

4½″ C.I. Eaves Gutter Collection.

Gutter.	S.E.	O.	J & C.	Domes.
25·0	2	2	5	7
2·6	2	1	1	4
10·6	2	1	2	—
3·6	2	1	1	11
6·6	2	1	2	
6·0	2	1	1	
54·0	12	7	12	Guard.
				1

3″ Down Pipe Collection.

R. W. P.	S. N.	Shoes.	B. to P.
2/ 18·0 = 36·0	2	2	2
10·6	1	1	1
9·0	—	1	1
5·0	3	1	2
13·0		1	—
8·0		1	6
7·0		2	
6·0		—	
2/ 5·6 = 11·0		9	
105·6			

				Special H.	R.W. Heads.		B. to Vertical Tiling.	
					2		2	
				1	1		1	
					1		—	
					1		3	
					2	Joints	Joints round	
					2	and Ears.	Tiling.	
					1			
					2	4	3	
					—	4	3	
					12	2	1	
						4	—	
						3	7	
						2		
						4		
						2		
				Pipes thro. wall.		3		
						2		
				6		4	(*These items*	
						—	*taken direct to*	
						34	*abstract.*)	

	4·0		
	1·8	6 8	Wrot. iron sashes of special design in small squares.
2/	2·6		
	1·8	8 4	Add do.
		15 0	
2/	2·6		
	1·8	8 4	E. O to part hung, and to include fastenings.
	1	1	Provide and hang large bell with drop pull, P. C. 10/, and provide for hanging bell in hall.

NOTE.— The Gasfitter, Bellhanger, and Electrician, if any, would follow here.

PLASTERER.

The sand to be clean and sharp, free from salt or clay, and washed if directed.

The lime to be the best chalk lime, that for the setting coat to be run into putty at least one month before required for use.

The hair to be the best long hair, and to be well beaten.

The laths to be the best rent laths, butted at joints, and the joints frequently broken.

The Portland cement for external work to be from approved manufacturers, and to be mixed in the proportion of one of cement to two of washed sand.

			Scullery.	4·3 4·0 2·6 2·0 7·0 1·0 20·9
	20·9 5·0	103·9	Portland ct. render to wall finished trowelled.	
	4·0 2·3	9·0	Add do.	
		112·9		
	13·0	13·0	6" width and arrris (window).	
	3·6 20·9	72·8	R. F. and S. in L. and Hair.	
2/	1·9 3·0	10·6	Add do. over door.	
		83·2		
	2·0 2·0	4·0	Add P. ct. in small pieces.	
	4·3	4·3	Run of circlr. arris in P. C.	
	4·3 2·10	12·1	E. O to circular face in P. ct. over R. F. and S.	
	20·9	20·9	E. O. to bead and quirk in P. C.	
	6	6	M. to do.	
	4	4	S. E. to do.	
	8·6 7·0	59·6	L. P. F. and S. to ceiling and 2ce whiten.	5·0 4·3 6·6 2·3 6·6 11·0 35·6
	35·6 8·0	284·0	R. F. and S. to walls.	

3/	2·10		
	6·4	53·10	Ddt. do.
	4·6		
	2·6	11·3	Ddt. do. (fire.)
	4·6		
	2·6	11·3	Ddt. (sash).
2/½	1·6		
	1·6	2·3	Ddt.
		78·7	
	35 6	35·6	6″ skirting in P. C. (square.)
	2	2	M. to do.
	4	4	Irregular do.
	8	8	S. E. to do.
	8·0		
	11·0	88·0	L. P. F. and S. to C. and 2ce W.

Sitting Room.

	10·0
	1·6
	3·6
	3·9
	7·6
	3·6
	3·6
	1·0
	2·0
	7·0
	2·0
	1·0
	10·0
	56·3

	56·3		
	8·0	450·0	R. F. and S. to walls in L. and H. *a b*.

2/	3·9		
	6·0	45 0	Ddt.
	7·0		
	3·0	21 0	Ddt.
	6·10		
	2·10	19 4	Ddt.
	2·0		
	3·0	6 0	Ddt.
	2·3		
	5·0	11 3	Ddt. do.
		102 7	
2/	8·0	16 0	Angles in K. in backing of P. C.
2/	8·0		
	1·6	24 0	In angles of small radius in do. do. E. O. *over-straight.*
	3·6		
	8·0	28 0	E. O of circle over straight.
	2·3		
	5·0	11 3	Ddt. do.
		10·9	
	14·0		
	10·0	140 0	L. P. F. and S. to ceiling and twice W.
2/½	4·3		
	2·6	10 8	Add ditto.
		150 8	
½/	3·0		
	3·0	4 6	Ddt.
	2·6		
	3·6	8 9	Add to L. P. F. and S.

	56·3	56·3	6″ P. moulded cornice.
	3·6	3·6	E. O. to circlr.
2/	1·6	3·0	Angles in small radius.
	3	3	M.
	6	6	Irregular do.
	4	4	Of circlr. to straight.

Stairs.

3·6
3·6
9·0
9·0
25·0

25·0		
18·0	450·0	R. F. and set to walls.
7·0		
3·0	21·0	Ddt. do. (D.)
8·0		
3·3	26·0	Ddt. do. (D.)
2·6		
3·6	8·9	Ddt. do. (W.)
7·0		
1·6	10·6	Ddt.
1·6		
2·6	3·9	Ddt.
	70·0	
18·0	18 0	6″ narrow width in K. on P. back and arris.

	25·0 1·0	25·0	Ddt. R. F. and S. for skirting.
	9·0 6·6	58·6	L. P. F. and S. to ceiling and twice W.
	7·0 2·6	17·6	Add do. in small pieces.
	4·0 3·0	12·0	Add do.
		29·6	
	14·3 3 0	42·3	Add do. but in soffits.
2/	3·3 3·3	21·2	E. O. do. in curved do.
	26·6 2·6	66·3	2*ce limewhite* to Cis. P.n.
	15·6 6·6	100·9	Do. to W.C.
		167·0	

First Floor—Two Bedrooms, N.E.

	5·0 12·0 10·0 6·0	
	33·0 9·6 3·6 8·0 12 0 10·6	
	76·6	76·6
76·6 7·0	535·6	R F. and S. to walls.

				6·3 5·6 11·9
	11·9 7·0	83·3	L. P. F. and S. to Q. P.	
	6·6 7·0	45·6	R. F. and S. in L. and H.	
3/	6·6 2·10	55·3	Ddt. R. F. and S.	
2/	1·6 3·0	9·0	Ddt. R. F. and S.	
		64·3		
2/	6·6 2·10	36·10	Ddt. L. P. F. and S. to Q. P.	
				20·0 0·9 19·3
	19·3 12·0	231·0	L. P. F. and S. and twice W. to ceiling.	
½/	3·0 6·0	9·0	Ddt. do.	
	17·0	17·0	E. O. to Keene's reveals, with double beaded angle 1·6 wide.	
			Bed Room, N.W.	
				14·6 10·0 6·0 5·6 10·0 46·0
	46·0 7·6	345·0	R. F. and S. to walls a b.	
	7·0 3·0	21·0	Ddt. do.	

	21·0	Bt. fwd.
5·0		
4·6	22·6	Ddt. do.
1·6		
3·0	4·6	Ddt. do.
4·0		
4·0	16·0	Ddt. do.
	64·0	
9·0		
4·6	40·6	L. P. F. and S. to Q. P.
14·6		
10·0	145·0	L. P. F. and S. to ceiling and twice W.
2·0		
5·6	11·0	Add do. to cupbd.
		Take area of walls for sizing and twice colouring.
		Make good after all trades.

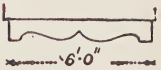
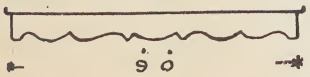
PLUMBER.

To include all soldered joints, wall hooks, &c., necessary for the due execution of the works.

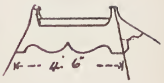
The water supply to be executed in accordance with the regulations of the water company, and to the satisfaction of their Inspector.

			Flats.
			5·8 2·8
			1·0 1·0
			0·4 0·6
			7·0 4·2
	7·0		
	4·2	29·2	6 lbs. lead in flat.
2/	0·9		
	1·0	·6	Do. in cesspool.

	1		1	E. O. to labour in forming do.
	1		1	End of roll bossed.
				2/ 6·0 = 12·0
				2/ 3·0 = 6·0
				18·0
	18·0			
	0·9	13	6	5 lbs. flashing.
2/	3·0			
	4·6	27	0	6 lbs. lead in flat.
2/	1		2	E. O. to labour in forming cesspool and outlet.
2/2	1·0			
	0·9	3	0	Add 6 lbs. in cesspool.
				3·6
				2·6
				2·3
				8·3
2/	8·3			
	0·9	12	10	5 lbs. flashing.
				1·0 9·0
				1·0 1·0
				– 0·6
				2·0 10·6
	10·6			
	2·0	21	0	6 lbs. lead in flat.
				25·0
				2·0
				27·0
	27·0			
	0·9	20	3	5 lbs. flashing *a b*.
2/2/	1·0			
	0·9	3	0	6 lbs. sides of cesspool.
2/	1		2	E. O. in labour to forming cesspool *a b*.

	4·0 4·0	16·0	6 lbs. lead in flat.
	11·6 0·9	8·8	5 lbs. flashing.
	5·6 1·0	5·6	5 lbs. lead apron.
	1	1	E. O. to labour in forming 
	4·0 1·0	4·0	5 lbs. lead apron.
	1	1	E. O. to labour in forming do. but 4/ long.
	9·0 1·0	9·0	5 lbs. lead apron.
	1	1	E. O. to labour in forming 
	18·0 1·0	18·0	5 lbs. step to chy.
	1·0 3·0	3·0	Do.
	1	1	E. O. to labour in dressing round chy. on plan.
	2·6 1·0	2·6	Add 5 lbs. step flash.
2/	1	2	E. O. to labour in forming flash to detail.

2/	9·0		
	1·0	18 0	Add 5 lbs. step flash.
	2·6		
	1·0	2 6	Add do.
		20 6	
2/½	2·3		
	2·3	5 1	5 lbs. vertical lead lining.
2/	1	2	Lead dot.
			Gutters.
	10·0		
	2·3	22 6	6 lbs. lead in gutters.
	12·9		
	2·6	31 11	Add do.
		54 5	
	22·6		
	0·6	11 3	5 lbs. cover flash.
	11·0		
	1·0	11 0	5 lbs. stepped flash *a b*.
			8·6 / 1·0 / 0·6 / 10·0 — 6·9 / 1·6 / 8·3
2/	18·3		
	2·3	83 2	6 lbs in gutter.
2/2	1·0		
	0·9	3·0	Add in cesspool.
		83 2	
2/	1	2	Labour to forming cesspool.
			4/0·3 = 18·3 / 1·0 / 19·3
	19·3		
	0·6	9·8	5 lbs. cover flash *a b*.

	4·9 3·0	14·3	5 lbs. do. to tower.
		23·11	
	1	1	E. O. to labour in forming flash to top, as sketch. 
	1	1	E. O. to dressing round finials.
	1	1	Pay fees for connection to main, including all digging and filling in and stop cock.
	28·0	28·0	¾" pipe to house, including all digging.

¾" To Cist.

	¾"	Stop C.	½"
23·0	screw dwn.		
8·0		1	10·0
1·0	1	1	
16·0			
18·0		2	
66·0			

	66·0	66·0	¾" service pipe.
	10·0	10·0	½" do. do.
	1	1	¾" screw down brass bib.
	2	2	¾" stop cocks.
	1	1	Do. ball cock.
2/	1	2	Brass unions and drilling to cistern.
	1	1	Allow in the estimate the P. C. sum of 5*l.* for W. C. apparatus.
	1	1	Do. do. 1*l.* 5*s.* for approved syphon water waste.
	8·0	8·0	1½" light supply to W. C.

	1	1	Allow for fixing W. C. apparatus.
	1	1	Drill for and fix 1½" light lead overflow to cistern, 1' 6" long, and hole through wall 9".
	7·6 4·0	30·0	5 lbs. lead safe under cistern.
1/	6·6	2·0	Soldd. angle to do.
	1	1	Provide for and fix 1" light lead overflow to safe, 18" long and hole through wall.

GLAZIER.

The whole of the glass to be the best of its several kinds, free from defects, and to be well puttied and back puttied.

	2·0 2·4	4·8	21 oz. glass in small squares, average 36" super.
3/	1·6 3·0	13·6	Add do.
			3·0 1·9 4·9
2/	4·9 2·9	26·2	Add do.
		44·4	
2/	2·6 1·6	7·6	Do. in iron sashes.
	4·0 1·6	6·0	Add do.
		13·6	
2/	3·6 1·8	11·6	Add glazing in wood sash *a b*.

2/	3·10		
	1·6	11·6	Add do.
		23·2	
	1·9		
	1·2	2·1	Ground glass do. do.
2/	1·3		
	1·6	3·9	Add 21 oz. plain *a b*.
2/	1·6		
	2·6	7·6	Do. do.
		11·3	
	2·9		
	2·0	5·6	Do. but in door and beaded in.
	4·0		
	2·0	8·0	21 oz. glazing *a b* in sashes.
	3·0		
	2·0	6·0	Glaze in fanlight in small squares.
	14	14	Glass tiles in roof, and cutting away through boarding.

PAINTER.

15·0	15·0	*Paint* 3 *coats oil on iron* sashes, P (3) B. S.
54	54	Do. squares both sides.
54·0	54·0	Do. 4½" eaves gutter (in and out).
105·6	105·6	Do. 3" square C. I. R. W. pipe.

	3	3	E. O. to swan necks.
	9	9	Do. shoes.
	41	41	Do. joints and clips.
	13	13	Do. heads.
	4	4	Do. W. I. air bricks.
	2	2	C. I. finials.
	4	4	Stoves black.
	1	1	Range do.
			2/0·8 = 1·4 4/0·5 = 1·8 3·0
	25·6 3·0	76·6	Paint (3) on girders.
2/	2·5	4 10	Do. chy. bar.
			Paint on Wood.
			Knot, stop, prime and paint 4 oils.
	619·4	619·4	(4) on planed fir in small pieces.
	33·0	33·0	Size and stain and 12″ to linings.
	229·0	229·0	Do. to soffits.
	19·0	19·0	Painting to pipe casing.

	35·0	35·0	3″ × 6″ moulded plate cut in 2 edges.
4/	14·0		
	2·6	140·0	Paint (4) on barge.
	56·0	56·0	3″ × 3½″ mould cut in on 1 edge.
2/	17·6		
	2·6	87·6	Paint (4) on barge.
	15·0	15·0	3″ × 3½″ mould cut in on 1 edge.
	41·6		
	2·6	103·9	Paint (4) *a b*.
	41·6	41·6	3″ × 3½″ mould cut in *a b*.
	16·0	16·0	Add do.
		57·6	
	16·0		
	2·6	40·0	Paint (4) *a b*.
	56	56	Ends of rafters 18″ long, paint (4).
	58·6	58·6	Paint (4) on wood (cistern).
3/2	2·11		
	6·11	121·1	Do. on doors
	16·5		
	0·8	10·11	Do. on linings.
	16·5		
	1·1	17·9	Do. add
	16·11		
	1·6	25·4	Do. do.
		175·1	

	48·0	48·0	$1\frac{1}{4}''$ × 10″ paint (4) cut in on 1 edge.
	126·3	126·3	$1\frac{1}{4}''$ × 7″ do. do.
2/	2·11 6·11	40·4	Paint (4) on door
2/2	2·9 6·9	74·3	Add do.
2/	16·0 1·0	34·8	Add do. linings.
	16·6 1·6	24·9	Add do.
	119·10 0·6	59·11	Add. do.
	175·10 0·6	87·11	Add do.
		321·10	
	176·0	176·0	E. O. to cut in 1 edge.
2/	6·11 2·11	40·4	Paint (4) on door.
2/2	1	4	Ordinary frame, 2 sides.
2/2	2·9 6·9	74·3	Paint (4) on door.
2/	2·2 2·8	12·3	Do.
	9·6 0·11	8·8	Do. on linings.

	2·8 2·0	5·4	Do. in sash fixed (6 squares).
	6	6	Do. squares, 2 sides.
2/	3·3 7·0	45·6	Do. on sash door.
	20	20	Squares, 2 sides.
2/	6·6 10·9	139·9	Paint (4) on gates.
	8·0 4·6	36·0	Paint (4) on sashes and frames, 1 side.
	1	1	3 light sash, 1side.
	54	54	Squares E. O. B. S.
	5·3 3·0	15·9	Paint 4 oils to sash and frame 1 side.
	1	1	2 light sash, 1 side.
2/	12	24·0	Squares B. S.
2/	5·0 7·6	75·0	Sash and frame paint (4).
2/	36	72	E. O. squares to do.
2/	1	2	Sash and transome light paint (4) 1 side.
	5·6 6·0	33·0	Paint 4 oils sash *a b* (2 light).

2/	21	42	Squares *a b*.
	1	1	2 light sash and frame.
	5·0 5·0	25	Paint (4) to sash *a b*.
	1	1	2 light sash and frame.
2/	32	64	Squares *a b*.
	2·0 2·3	4·6	Paint (4) on sash *a b*
	6	6	Squares *a b*.
	1	1	Small sash *a b*.
	4·6 6·0	27·0	Paint (4) on sash *a b*
2/	18	36	Squares *a b*.
2/	9	18	Do. add.
		54	
	1	1	4 light sash *a b*.
	3·3 7·0	22·9	Paint (4) on sash.
2/	27	54	Squares *a b*.
	1	1	4 light sash *a b*.
	12·0 4·6	54·0	Paint (4) on sash.

5/	18	90	Squares *a b*.
	1	1	5 light sash.
	25·3	25 3	Paint (4) to wall string, cut in 1 edge.
2/	11·6	23 0	Do. outer do.
	16·6	16 6	Capping 9″ girth.
	27·0	27 0	$4\frac{1}{2}$″ × $4\frac{1}{2}$″ newel 4 sides
	5·0	5 0	Lining to string.
	8·0	8 0	9″ moulded skirtg.
	5·0	5 0	Add do.
	82·6	82 6	1″ × 1″ square ballusters.
2/	8·6 6·0	102 0	$1\frac{3}{4}$″ spandril, paint (4).
			Attend upon all trades, and leave all perfect at completion.

ENTRANCE LODGE *(continued)*

ABSTRACT

OF EXCAVATOR (AND DRAINS)
BRICKLAYER, TILER, MASON, CARPENTER, JOINER
IRONMONGER, SMITH AND FOUNDER, PLASTERER
PLUMBER, GLAZIER AND PAINTER

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ENTRANCE LODGE.

ABSTRACT OF EXCAVATOR (AND DRAINS).

ABSTRACT OF EXCAVATOR (AND DRAINS).

PROPOSED ENTRANCE LODGE FOR _____.

	Cube.	*Cube.*	*Sup.*	*Run.*	*Run.*	*Run.*	*Nos.*	*Nos.*	*Nos.*
Preliminary from taking off p 254.	D. R. P. F. I. and ram to foots and cart away surplus, about ½. 159·6 288·9 316·11 106·11 33·9 27)905·10 33·15 yds. ft. 33 15	P. cement concrete in foots 1 to 7. 159·6 288·9 316·11 106·11 33·9 27)905·10 33·15 yds. ft. 33 15	P. cement concrete under floor, 6″ thick. 9)104·11 11·6 yds. ft. 11 6	Dig for 4″ glazed stone pipe and P. F. I. and remove surplus, average 3·6 deep. 147·0 14·0 161·0	Concrete 6″ thick, laid to fall in trench for 4″ drain. 147·0 14·0 161·0	4″ glazed stoneware drain, of tested pipes, &c. 147·0 14·0 161·0	6″ gulleys with 4″ outlet. 8	E. O. to taper pipe 6″ to 4″. 1 E. O. to 4″ off 4″. 4 1 5	All labour and materials in digging for and forming inspection chamber in 9″ brickwork in cement, faced with glazed bricks and finished at bottom with cement floated surface, and having half-glazed pipes with all junctions, &c., and making good to inside of chamber, and having W.I. cover with patent air-tight joint, &c., complete, including also a Kenon syphon and 2 junctions of 6″ off 6″ and 1 of 4″ off 6″. 1
Area for D.S. 1 story. 2·54 = 2½ squares. Do. 2 stories. 5·72·6 squares.	D. R. and cart away. 159·6 288·9 316·11 106·11 33·9 209·11 27)1115·9 41·9 yds. ft. 41 9		D. R. surface soil 9″ thick, and stack at a distance of 30 yards. 1327·0 286·6 9)1040·6 115·5 yds. ft. 115 5 Ddt do. 286·6	Do. do. 6″ do. do. 58·0	Do. do., but for 6″ drain. 58·0	Do. do., but 6″ do. 58	Do., with 6″ do. 1	E. O. to 4″ off 6″. 1 E. O. to 4″ bends. 8	Attend upon all Trades, &c.
Preliminary, page 4, from taking off.			6″ P. cement concrete and float under tiles. 61·0 35·9 52·0 27·0 9)175·9 19·6 yds. ft. 19 6 Do. under wood block floor. 84·0 221·0 9)305·0 33·8 19·6 53·2 yds. ft. 53 2	Do. do. for ¾″ service pipe. 28·0				E. O. to 6″ P. trap. 1 E. O. to inspection syphon, with cover complete. 1	

ENTRANCE LODGE.

ABSTRACT OF BRICKLAYER.

PROPOSED ENTRANCE LODGE FOR_____.

Prelim. from page 260.

Sup.

3 B.
20 10
34 6
55 4
2
110 8

Sup.

2½ B.
32·8
50·0
82·8
5
3)413·4
137·9

Sup.

2¾ B.
10 0
29 4
39 4
9
6)354 0
59 0

Sup.

2 B.
47 3
80 1
39 0
160 4
4
3)665 4
221 9

Sup.

D. P. C. of 2 courses of slates in ct.
40·6
68·8
23·4
50·9
25·4
6·7
215·2

Run.

E. O. bk. on edge coping and tile creasing in ct.
15·0
Do., but circlr.
10·0

Nos.

Nos.

Frames B. and P. in L. and H.
10
Large do.
3
Air bks. fix.
4

Nos.

E. O. to rough arches.
2′ 9″ opening, 1 B soffit.
2
Do., but ½ B soffit.
2

Cube brickwork.

38·2
60·0
101·3
199·5
8
9)1595·4
177·2

1½ B.

76·2
40·0
264·4
123·9 Ddt. do.
107·6
674·6 34 7
141·9 19 4
67·6 70 5
14 3
1495·6
227·4 138 7
88 9
1268·2
1169·5 227 4
137·9
110·8
22·6
221·9
59·0
47·2
177·2
272)3213·7(11
272
493
272
221
r. ft.
11·221

1 B.

67·6
208·8 Ddt.
380·0 do.
127·5
142·0 22 0
187·6 43 2
524·3 3 0
328·1 43 2
49 0
1965·5 41 0
201·4
201 4
1754·1
2
3)3508·2
1169·5

½ B. ddt.

28 11
7 11
40 10
72 10
115 11
3)266 5
88 9

1¾ B.

16·11
23·8
40·7
7
6)284·1
47·2

¼ B.

39·9
18·0
16·6
6·0
28·0
27·0
6)135·3
26·6

1 B. circlr., radi. ¼ ft.

46·9
1·0
47·9
15·4
34·5
2
3)78·10
26·3
ft. in.
26·3 rad. ¼ ft.

Ddt. ½ B. circlr.

2)26 8
13 4

Sup.

6″ × 6′ tile paving, laid diagonally.
61·11
35·9
53·11
16·0
9)167·7
18·6
yds. ft.
18·6

Run.

E. O. bk. on edge cill, 4½″ on face and tile creasing.
17·9
Do·, but circlr.
3·6
E. O. sill as *a b*, but 14″ and double chfd.
8·0
E. O. to moulded plinth.
147·0
Do. circlr.
6·0
E. O. to beam fill to 9″ wall.
42·6

Nos.

M. to plinth.
37 S.E.
5
Special M.
2 Do. to circlr.
2

Nos.

Chy. pieces set.
5
Stoves set.
4
Range set.
4
Copper set.
1
Sink set.
1
Flues P. and C.
6
Chy. pots and fix.
6

Nos.

2′ 6″ opening, but 1 B soffit.
1
Do., but 1½ B soffit.
2
3′ 6″ opening, but 1 B soffit.
1
2
3
3′ opening, but 1 B soffit.
4

[*Continued on p.* 345.

ENTRANCE LODGE.

ABSTRACT OF BRICKLAYER—*cont.*

Facings.

Sup.

E. O. to facing of selected red facing bricks.

578·0
318·0
39·0
231·3
88·6
325·5
29·9
277·11
185·3
82·0
143·9
121·0
62·8
128·8
174·8
2785·10
145·0
2640·10

Ddt. do.

15·8
15·11
28·9
10·7
41·5
19·2
13·6
145·0

Sup.

Red facing *a b*, but circlr.

60·6
7·3
53·3

Ddt.
7·3

Facing of white glazed bricks.

10·0

Sup.

In gauged semi-arches, picked bricks.

37·1
45·9
82·10

Do. segmental.

6·9
4·3
1·2
3·1
15·3

Do. circlr. on plan.

1·11

Fair cut skewback

1·6
9
4½
4½
9
3·9

Run

E. O. to circlr. cut to facing.

34·6
14·11
7·6
4·6
1·9
3·6
8·0
13·0
11·0
9·0
24·0
131·8

Do. to circlr. wk.

3 3

Sup.

Sleeper and fender walls.

1¾ B.
8·6
7
6)59·6
9·5

1 B.
21·3
2
3)42·6
14·2
9·5
23·7

Sup.

E. O. to fair cut to brick-work.

72·0
5·3
77·3

½ B. trimmer arch in cement, including centre.

17·0

Run

Cover flashings W. and P. in cement.

115·0

Step do.

55·0

E. O. to labour to forming stack to plan.

12·6

Do. do., but plan thus:

10·0

Nos.

Cut away through 9″ wall, and make good for overflow.

2

Do. do., to 9″ wall for 3″ R. W. P.
6

Cut away through wall for outlets from cesspools.

7

Nos.

Build piers to sink 2′ 3″ × 1′ 6″ × 4½″ in white glazed bricks.

2

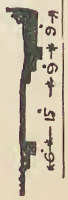
Doulton's sink 2′ 3″ × 1′ 6″.

1

Labour to forming tumbling in courses, as sketch:

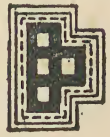
3

E. O. to labour in forming cap to detail.



1

Do. do., but plan thus:



1

Provide the P. C. sum of £ for hearths, tile, and add for labour and materials of laying, including cement float.

5

Attend upon all Trades, &c.

1

E. O. labour in forming rough brick relieving arch to 5′ 6″ opening, and 1 B. soffit.

1
1
2

4′ 0″ opening ½ B soffit.

1

1′ 6″ opening, ½ B soffit.

1

8′ 6″ opening, but 1 B soffit.

1

346

ENTRANCE LODGE.

ABSTRACT OF TILER.

PROPOSED ENTRANCE LODGE FOR _____

The tiling to be the best quality Broseley, laid to a 3½" gauge, each tile to be secured with 2 compo nails.

Sup.

Tiling to roof as described.

390·0
17·0
22·0
911·7
178·6
42·8
12·0
88·6

1662·3
75·2

100)1587·1

15 sqs. 87 ft.

Ddt. do.

15·2
38·0
22·0

75·2

Sup.

Vertical tiling, hung to a 3" gauge.

184·0
228·0
17·6
167·6
99·0
30·0
82·0
14·0
16·0

838·0
65·0

100)773·0

7 sqs. 73 ft.

E. O. to ornamental over plain.

138·0
171·0
50·0
20·0
12·0

391·0
65·0

100)326·0

3 sqs. 26 ft.

Ddt. do. and vertl.

19·3
29·9
16·0

65·0

Run

Valley tiles E. O.

10·0
38·6

48·6

Ridge tile P. C. 1*s.* 6*d.* per foot, and fixing.

59·0

Special angle tiles for vertical tiling.

28·0

Run

E. O. to cutting of vertical tiling for feet of rafters.

35·0

Cement point to verges.

136·6

Run

E. O. to cutting round angle chy.

14·0
24·0

38·0

Nos.

Do. to forming opening in vertical tiling as sketch.

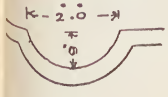
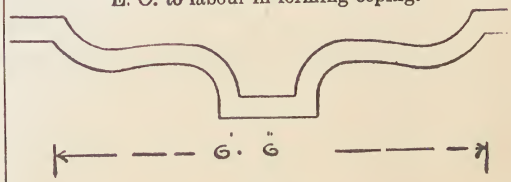
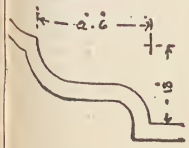
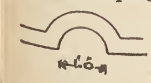
2

Leave all perfect at completion.

ENTRANCE LODGE.

ABSTRACT OF MASON.

PROPOSED ENTRANCE LODGE FO_____.

	YORK STONE.					PORTLAND STONE.		
	Run	*Nos.*	*Run*	*Nos.*	*Nos.*	*Nos.*	*Nos.*	*Nos.*
Prelim. from p. 291.	9″ × 3″ rough York core. 25·6	Hard York tooled template, 14″×14″×3″. 1	Stone sill 4″ × 10″, tooled on 3 faces. 13·2	Spur stones 2′ 6″×14″×9″, with rounded top. 2	Mortises in sills. 8 1 9	E. O. to M. angles 4″ × 14″ coping. 2 1 4 7		Provide the sum of £ for mantels, including kitchen mantel.
	E. O. to tooled edge. 51·0	Do. with rounded corners. 2	Do. 14″ × 6″ do. and end. 23·0	Moulded corbels, 14″ × 18″ × 6″. 4	End of C. C. and Pd. 8	E. O. to labour in forming coping.  2	E. O. to labour in forming coping.  1	
			Measd. nett. Portland coping, 6″ × 14″ twice throated and weatd. to rear. 78·9	9″ × 14″ × 6″ tooled template, including all sinkings for gate hinges and fixing. 4		E. O. to labour in forming ramps to coping.  2	Do. do. do., but 9′·6″. 1	Attend upon all trades, &c.
						E. O. to labour in forming to coping  1		

BOX GROUND BATH STONE.

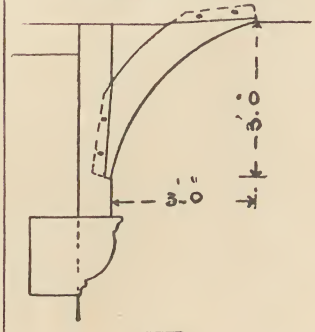
	Sup.	*Sup.*	*Run*	*Nos.*	*Nos.*
Cube stone.	½ saw.	P. face and beds and J.	Labour to forming double chfd. jamb.	E. O. to mitred angles of jamb and head.	Slate dowels.
2·8	11·8	7·0	8·3	2	2
8	2·0	1·6	8·3		
11·10	12·5	12 5			
15·2	12·5	3·1	16·6		
	5·8	3·5			
	2)44·2	27·5			
	22·1		Do. to forming head.	Do. to junction of mullion with head.	Mortices.
			3·6	1	4
			Do. forming mullion.	Do. to mitred intersection of jamb and mullion to sill.	
			2·6	4	
			Do. forming transome.	Do. to mitred intersection of jamb to transome.	
			2·0	2	
			Do. do. sill.		
			4·0		

ENTRANCE LODGE.

ABSTRACT OF CARPENTER.

PROPOSED ENTRANCE LODGE FOR _____.

Prelim. from p. 291.	*Cube.*	*Cube.*	*Cube.*	*Sup.*	*Sup.*	*Sup.*	*Run*	*Run*	*Nos.*	*Nos.*
	Fir in plates and lintels.	Fir in G. F. joists.	Fir framed in roof.	Planing to fir.	⅜" boarding and battens.	¾" battens and plugging to wall for vertical tiling.	Chfr. on fir.	Labour to forming moulded plate 3" × 6".	Stops to chfs.	Wright's patent fixing blocks.
	26·7 4·4 5·8 4·5 12·11 3·3 6 57·8	11·4 6 11·10	47·6 59·0 44·4 150·10	403·9 25·5 66·0 68·6 28·11 41·6 19·0 Ddt. 653·1 33·9 33·9 619·4	1168·5 109·4 52·3 Ddt. 1330·0 58·0 1272·0 sq. ft. 12·72	7·49	416·9 Rough bracketing to R.I.J., 10" deep. 24·0	35·0 Roll to flat. 4·0 Drip to do. 3·0 5·6 8·6 Tilt fillet to roof. 83·6 Do. to vertical tiling. 91·6	84 Labour to forming cesspool heads and outlets. 4 1 2 7 Do. in cut ends to rafters and planing. 56	164
	Do. circular. 1·6	Fir framed in floors. 22·2 30·4 6.7 3·11 63·0	Do. in cut joists to form flat. 9⅓ 7½ 1·5½ 2·10	Firrings and ¾ Bd. to flats in small pieces. 14·3 3·6 4·6 18·0 40·3	1¼" deal wrot. double bd. and tongd. lining to girder. 33·0					
	Fir in beams, S. reversed and bolted. 18·0									
		Do. in truss under beam. 10·6	Fir framed in quarter partitions. 10·4	¾" Gutter Bd. and bearers. 55·9	1" wrot. and bd. casing to pipes. 19·0				E. O. to labour in forming truss as sketch, fir taken.	
					¾" wrot. 1 side and matched casing to cistern, including all blocking pieces, &c. 32·6					
					Do. do., but ledged as cover. 26·0					



4

[Continued on p. 350

ENTRANCE LODGE.

ABSTRACT OF CARPENTER—*cont.*

BARGE BOARDS.

Sup. $2\frac{1}{4}'' \times 12''$ deal wrot. and double chfd. barge board.	*Run.* $3'' \times 3\frac{1}{3}''$ moulded verge mould.	*Nos.* E. O. to cut ends to barge board.	*Nos.* E. O. to housing plate to barge board.
65·4	56·0	4	4
17·6	15·0	6	6
48·3	41·6	1	2
18·8	16·0	—	—
149·9	15·0	11	12
	143·6		
		Do. to mitred top to do.	Do. of ridge to do.
		2	3
		3	2
		5	5

CENTRING AND TURNING PIECES.

Nos. 4 feet centre, $1\frac{1}{2}$ B. soffits, use and waste of.	*Nos.* 3′ 9″ centre to segmental arch, $\frac{1}{2}$ B. soffit.	Turning pieces to 3′ 0″ opening, $\frac{1}{2}$ B. soffit.	Turning piece 2′ 9″ opening, $\frac{1}{2}$ B. soffit.
2	1	2	1
		1	
		3	
Do. centre 8′ 6″ semi. and 2 feet deep.		Do. to 2′ 6″ opening, $\frac{1}{2}$ B. soffit, circular on plan.	Allow for attendance upon all Trades.
1		1	1

ENTRANCE LODGE.

ABSTRACT OF JOINER.

PROPOSED ENTRANCE LODGE FOR _____.

Flooring—

Sup.

3″ wood block paving.

90·9
4·8
221·0 Dit. 9·0
316·5
9·0
9)307·5
34·1

Sup.

1¼″ yellow deal floor in batten widths, tongued in iron.

161·0

Sup.

1″ floor, straight joint, laid folding.

229·0
160·0
6·11 Dit. 17·6
66·8
462·7
17·6
445·1

Sup.

1″ deal W. 1 side and V-jointed boarding for staining.

229·0

Sup.

Run.

3″ M. margin to wood block.

7·3

Skirtings—

1¼″ × 10″ deal W. and mouldd. skirt. with proper grounds.

44·6

Do. circular.

3·6

1¼″ × 7″ deal wrot. torus and grounds.

126·3

Run.

Moulded capping to gate, 3″.

10·9

Run.

2″ C. and M. margin to 1″ floor.

18·6

Nos.

E. O. to M. to 1¼″ × 10″ skirting.

3

Do. M. and R. E.

6

E. O. to M. to 1¼″ × 7″

15

Run.

⅜″ wrot. grounds.

119·10
37·6
19·2
9·5
185·11

Run.

1¼″ C. and M. margin to 1¼″.

6·10

Nos.

E. O. to small circlr. angles.

2

Do. to irregular M.

4

E. O. to M. and R. E.

22

Run.

3″ archt.

175·10
17·0
28·0
39·6
20·2
10·5
290·11

Nos.

Do. of M. of straight to circlr.

6

Do. to irregular M.

10

Run.

1″ × 2½″ deal chfd. archt.

49·0
18·6
67·6

2½″ angle mould.

6·2

Nos.

3″ archt. M

18
6
4
2
6
2
38

2½ M.

2

3½ do

2

Doors—

Cube.

Deal wrot. R. and M. frame, with transome.

3·7

1¾″ deal wrot. ledged and braced door.

32·6

1½″ deal W. 2 panel high, hung folding, M. O. S.

26·2

Deal wrot. rebtd. and chfd. frame.

7·4
2·4
9·8

1″ ledged and wrot. trap door.

5·0

1¾″ deal wrot. 4 P. door and M. B. S.

53·4
17·9
71·1

Do. 4 panel square.

16·3

1¾″ deal wrot. 4 P. door M. 1 side and square other.

16·3

2″ deal wrot. 4 P. M. O. S. and bead flush other.

17·9

2″ 3 panel door. 2 panels high, upper glazed in 20 squares.

16·3

2½″ deal W. and P. gates, panels filled in with 1¼″ beadd. and tongued boarding, hung folding.

61·6

1½″ tongued and glued shelves.

16·6

Sup.

1¼″ deal wrot., beadd. and rebtd. lining.

8·3
18·6
7·1
33·10

Do. double rebtd.

15·1
51·4
66·5

Do. and panelled head butt.

21·11

Moulded capping to gate, 3″.

10·9

Do. circular on plan.

12·2

Do. circlr. on plan.

13·2

3½″ do.

13·0

⅜″ × 2″ wrot. and chfd. fillet.

6·0

M. to 1″ × 2½″

6
2
8

Labour to forming ramp to gate capping

2

Continued on p. 352.

ENTRANCE LODGE.

ABSTRACT OF JOINER—*cont.*

Sashes and Frames— *Cube.*	*Cube.*	*Sup.*	*Sup.*	*Run.*	*Run.*	*Nos.*	*Nos.*
Fir in W. R. and dble. chfd. casement frames and transome.	Oak sunk weathd. and throatd. sill.	2″ casement sashes in very small squares, fixed.	2″ moulded and fixed fanlight.	1″ × 7″ splayed wrot. linings, rebtd. and beaded.	$1\frac{1}{4}$′ × 9 wrot., rebtd. and rounded window board.	M. and retd. ends to window board.	M. and retd. ends to moulded oak sill
9·9	3·8	9·9	5·4	16·0	9·0	4	6
		4·10		13·0	6·0	2	
		12·0		13·0	4·6	2	
		26·7		36·0	4·6	4	
				8·9	2·6	2	
				86·9	7·0	14	
					3·9		
					37·3		
Do. do. circular on plan, measd. nett.	Do. do. circular, measd. nett.	Do., hung.		Do. circlr. on plan.	Do. circlr. on plan.		
1·11	2·9	14·8		11·6	2·6		
		9·9					
		12·0					
		32·2					
		7·4					
		11·9					
		1·11					
		89·7					
Fir in dble. chfd. and rebtd. cast. frame, no transome.	Oak in sunk weathd. and throatd. sill, but moulded on edge.	Do. do. circular on plan.					
7·5	3·8	11·3					

[*Continued on p.* 353.

ENTRANCE LODGE.

ABSTRACT OF JOINER—*cont.*

Staircase—

Sup.	*Sup.*	*Sup.*	*Sup.*	*Run.*	*Run.*	*Nos.*	*Nos.*	*Nos.*	*Nos.*
1¼" tongued and glued landing.	1¼" deal W. and Mld. treads with 1" rebated risers.	1⅝" wrot. and beaded outer close string.	1⅝" framed spandril, 3 panels high, M. O. S.	2" × 3" moulded capping.	7" × 9" moulded skirt. to match string.	Ramps to strg.	E. O. to turnings to newel.	Housings T. and R. to string.	1 step ladder 8′ 6″ long, and fitted with iron hooks at end and staples to floor.
23·0	36·11	11·6	20·8	16·6	8·0	13	6	22	1
6·3	8·9				5·0	S. and retd. ends to skirt.		H. winders to do.	
29·3	45·8				13·0	2		6	
	M. feather-edged winder and riser.	1½" flush beadd. wall string.	⅝" wrot. and beadd. apron lining.	4½" × 4½" moulded and turned newel.	E. O. to forming nosing on floor.	Ballusters, fix.	Do. moulded heads to do.	H. winders to newel.	
	14·3	30·3	5·0	27·0	12·6	30	6	6	
				3" × 2½" moulded mahogany handrail and French polsd.		E. O. to labour in forming door in do.	Do. drops to do.	H. quarter space to string.	Attend upon all trades, &c.
				16·6		1	6	1	
				1" × 1" square bar ballusters and fixing.				Do. to newel.	
				82·6					

ENTRANCE LODGE.

ABSTRACT OF IRONMONGER.

PROPOSED ENTRANCE LODGE FOR _____.

Prelim., see Bill, p. 381.	*Nos.*	*Nos.*	*Nos.*	*Nos.*	*Nos.*	*Nos.*	*Nos.*	*Nos.*
	Pairs of 2½″ butts.	Pairs 12″ T hinges.	6″ barrel bolts.	6″ mortice locks and approved china furniture.	Night latch, P. C. 15*s.* complete with 2 keys.	Approved gun-metal cock-spur fastenings.	Approved stop to gates.	Knob to door, P. C. 2*s.* 6*d.*, and fix.
	3	2	2	3	1	3	1	1
	2	1	1	2		2		
	4	1	3	5		2		
	2	4				4	Approved stay bar to foot.	
	4					2	1	
	2					2		
	2					3		
	2					18		
	1							
	22							
	Pairs of 3″ butts.	Pair of 3′ 6″ patent (Collings') gate hinges.	10″ barrel bolts.		Norfolk latch.		Drop handle and gate latch, P. C. 7*s.* 6*d.*	Iron shoes to solid frames.
	3	2	2		2		1	4
	3		3					
	1		5					
	2							
	1							
	10			6″ rim locks and approved brass furniture.		Stay bars and fastenings to transome lights.		2½″ iron button.
	Pairs of 3½″ butts.			1		2		1
	1			1				
				1				
				3				
			12″ barrel bolts.				Knocker, P. C. 5*s.*, and fix.	12″ × 14″ W. I. shelf brackets
			2				1	2
			Cupbd. bolts.	Cupbd. lock.		Special stay bars.		Ease and adjust all fastenings.
			4	1		17		
						2		
						1		
						20		

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ENTRANCE LODGE.

ABSTRACT OF SMITH AND FOUNDER.

PROPOSED ENTRANCE LODGE FOR _____.

Prelim., see Bill, p. 380.

Run.

8″×5″ R. I. J. and ½″ top plate.

Weight 46 lbs.

13·6
12.0
25·6
46
150
100
23
1173

112) 1173 (10
112

53
28
25

cwts. qr. lbs.
10 . 1 . 25

This can be weighted out if desired, remembering that the metal weighs 40 lb. per foot super when 1″ thick, and the Table on p. 395 can be used as follows:—
14·6
3·33
1 qr. 21 lb.

Nos.

½″ bolts and nuts, 9″ long.

5
3
8

Do. do., 11″ long, with heads and nuts to wood brestsummer.

10

Angle plate, 7″ long, and drilling and bolts 4.

1

Sup.

2 × ½″ chy. bar with split ends.

2·5
38
76
19

qrs. lbs.
28) 95 (3 11
84
11

qrs. lbs.
3 . 11

Nos.

Drilling to R. I. J.

5
3
8

E.O. to labour in connecting 2 R. I. J. 5″ × 8″ and top plate.

1

Sup.

W. I. sashes of special design in small squares, fixed.

15·0

E. O. to hang and to include fastenings.

8·4

Run.

4½″ moulded eaves, gutters

54·0

3″ R. W. P.

105·6

3″ galvanised ventilator.

41·0

Nos.

S. ends. Outlets.
12 7

S. Necks. Shoes.
3 9

Bends. Mica inlet.
5 1

12-gall. copper, galvanised.

1

Provide in the estimate the P. C. sum of 1*l.* 5*s.* each for finials.

2

Nos.

J. and C.

12

B. to P.

6

3″ cowl, extract.

1

Set of copper fittings.

1

Provide in the estimate the P. C. sum of *l.* for stoves and range and add for carriage and fixing

1

Nos.

Do. to tilg. R. W. Heads.
3 12

W. I. air bricks.

4

Nos.

Special H.

1

Provide and fix, including hoisting, a gal. I. tank,

6′/×3′/×4′/.

1

Provide and hang a large bell, with drop pull, P. C. 10*s.*; bell to ring in hall.

1

Attend upon all Trades, &c.

1

Nos.

Joints.

34

Do. round tiles.

7

ENTRANCE LODGE.

ABSTRACT OF PLASTERER.

PROPOSED ENTRANCE LODGE FOR_____.

Prelim from p. 323.

—

Sup.

R. F. and S. to walls in L. and H.

83·2
284·0
450·0
450·0
535·6
45·6
345·0

2193·2
404·5

9)1788·9

198·6

yds. ft.
198·6

Do. do. circlr.

9)16·9

1·8

yd. ft.
1·8

Ddt do.

78	7	(not circular)
102	7	
70	0	
25	0	
64	3	
64	0	
404	5	

Sup.

L. P. F. and S. to ceiling and twice W.

59·6
88·0
150·8
8·9
58·6
29·6
231·0
145·0
11·0

781·11
13·6

9)768·5

85·3

yds. ft.
85·3

Ddt.
4·6
9·0
13·6

Do. in soffits.

9)42·9

4·6

yds. ft.
4·6

Do. do. curved.

9)21·2

2·3

yds. ft.
2·3

Sup.

L. P. F. and S. to 2 P.

83·3
40·6

123·9
36·10

9) 86·11

9·6

yds. ft.
9·6

Ddt. do.
36·10

Sup.

Twice limewhite.

9)167·0

18·5

yds ft.
18·5

Size and twice colour to walls.

198·6
9·6
1·8

210·2

yds. ft.
210·2

Sup.

Portland cement render to wall, finished with trowelled face.

9)112·9

12·4

yds. ft.
12·4

Do. in small pieces.

4·0

Do. do., but circlr.

12·1

Run.

Circular angles in Keenes of small radius.

24·0

Run.

Do. under 6″ wide and arris to window.

13·0

E. O. to circlr. arris.

4·3

Bead and quirk in P. cement.

20·9

6″ square P. C. skirting.

35·6

Angles in K. on back of P.

16·0

Do. in narrow widths.

18·0

Do., but with double beaded angle 18″ wide.

17·0

6″ plaster moulded cornice.

56·3

Do. circlr.

3·6
3·0

6·6

Nos.

M.	S. E.
6	4
—	—

Irreg. M.

M.	
2	4
—	—

S. E.

8

—

Irreg. M.

M.	
3	6
—	—

Do. circlr. to straight.

4

—

Attend upon all trades at completion.

357

ENTRANCE LODGE.

ABSTRACT OF PLUMBER.

PROPOSED ENTRANCE LODGE FOR _____.

Milled lead and labour in flats, flashings, &c.

Prelim. from p. 330.

Sup.

6 lbs.

Milled lead in flats.

29·2
1·6
27·0
3·0
16·0
54·5
85·2
21·0
3·0

240·3
6

28)1441·½

4)51·13

12·3·13½

cwts. qrs. lbs.
12 . 3 . 13½

Run.

¾" service pipe.

94·0

Sup.

5 lbs.

Cover flash and side of dormer.

13·6
12·10
20·3
8·8
5·6
4·0
9·0
5·1
11·3

90·1
5

28)450

4)16·2

4·0·2

cwts. qr. lbs.
4 . 0 . 2

5 lbs. lead safe.

30·0
5

28)150

4)5·10

1·1·10

cwt. qr. lbs.
1 . 1 . 10

Run.

½" do. do.

10·0

Sup.

5 lbs.

Step flash.

18·0
3·0
2·6
20·6
11·0
23·11

78·11
5

28)394·½

4)14·2½

3·2·2½

cwts. qrs. lbs.
3 . 2 . 2½

Run.

1½" light supply.

8·0

Run.

Soldd. angle.

2·0

Nos.

E. O. to labour in forming cesspool and outlet.

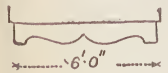
1
2
2
2

7

E. O. to end of roll bossed.

1

E. O. to labour in forming lead apron to detail.



1

Do. do., but 4/ not 6/.

1

Do. do., but 9/.

1

¾" in. screw-down brass bib.

1

¾" stop cocks.

2

¾" ball cock.

1

Brass unions and drilling to cistern.

2

Nos.

E. O. to labour in dressing round chimney on plan.

1

E. O. to labour in forming flashing to detail.

2

Drill for and fix 1½" light lead overflow to cistern, 1' 6" long.

1

Provide for and fix 1" light lead overflow to safe, 18" long and joints.

1

Provide for and pay fees for connection to main, including all digging and stop cock complete.

1

Nos.

Make good through roof and flash round.

1

Allow in the Estimate the P. C. sum of for W. C. apparatus.

1

Allow in the Est. for approved syphon water waste P. C. 1*l.* 5*s.* and fixing.

1

Allow for fixing W. C. apparatus.

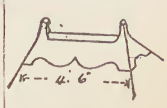
1

Nos.

Lead dots.

2

E. O. to labour in forming flashing to base of finial, as sketch.



1

Wire domes

11

Guard

1

Attend upon all Trades.

ENTRANCE LODGE.

ABSTRACT OF GLAZIER AND PAINTER.

PROPOSED ENTRANCE LODGE FOR_____.

	Sup.	*Sup.*	*Sup.*	*Sup.*	*Nos.*
Prelim. from p. 335.	21 oz. glass in small squares, average 6″ each way.	Do., glazed in iron sashes.	21 oz. ground glass in very small squares.	21 oz. glazing in small squares to door, but beaded in.	Glass tiles in roof, and cutting through boarding.
	44·4 23·2 11·3 8·0 86·9	13·6	2·1	5·6 6·0 11·6	14 Leave all perfect at completion.

ABSTRACT OF PAINTER.

PROPOSED ENTRANCE LODGE FOR_____.

Paint 3 Oils on Iron.

Sup.	*Run.*	*Run.*	*Run.*	*Nos.*	*Nos.*
Paint 3 oils on iron.	Iron sashes.	4½″ eaves, gutters in and out.	3″ square C. I. R. W. pipe.	Squares iron, both sides.	E. O. to swan-necks to down pipe.
9)76·6 8½ yds.	B. sides. 15·0 ft. 15·0	54·0 ft. in. 54·0	105·6 ft. in. 105·6	12)54 4½ 4½ dozen	3
				W. I. air bricks. 4	Do. to shoes. 9
	Chy. bar 4·10			Stoves, black. 4	Do. to heads. 13
				Range. 1	Joints and clips. 41
Prelim. see Bill p. 381.				C. I. finials. 2	

[*Continued on p.* 359

ENTRANCE LODGE.

ABSTRACT OF PAINTER—*cont.*

Knot, Stop, Prime and Paint 3 Oils on Wood.

Sup.	*Sup.*	*Run.*	*Run.*	*Run.*	*Run.*	*Nos.*	*Nos.*	
Paint 4 oil on wood.	Paint (4) on sashes and frames.	3″ × 3½″ verge mould, cut in 1 side.	1¼″ × 10″ paint (4) and cut in on two edges.	4 oils to wall string cut in.	Capping 9″ girth.	Frames paint (4) 2 sides.	Squares, B. sides.	Attend upon all trades, &c.
619·4	36·0	56·0	48·0	25·3	16·6	4	6	
140·0	15·9	15·0				—	20	
87·6	75·0	57·6					54	
103·9	33·0	128·6					24	
40·0	25·0						72	
58·6	4·6						42	
175·1	27·0						64	
321·10	22·9		1¼″ × 7″ do. do.	9″ moulded skirting.	4½″ × 4½″ newels, 4 sides.	Do. do. 3-light sash, 1 side.	6	
40·4	54·0	3″ × 6″ moulded plate cut in on both edges.	126·3	13·0	27·0	1	54	
74·3	5·4					—	90	
45·6	9)298·4	35·0					12)434	
139·9	33·2		E. O. to cut in 1 edge to archts.		1″ × 1″ square bar ballusters.	Do. do. 2-light.	36	
12·3	yds. ft.		176·0		82·6	1	doz.	
8·8	33·2					1	36½	
19·0						1	—	
23·0						—		
5·0						3		
102·0						—		
9)2015·9						Do. do. 1-light and transome.	Ends of rafters 18″ long, paint (4)	
224·9						2	—	
yds. ft. 224·9						—	56	
Size, stain and twice varnish to linings and soffits.						Small sash.	—	
9)262·0						1		
29·1						—		
yds. ft. 29·1						Do. do. 2-light, with transome.		
						1		
						1		
						—		
						2		
						—		
						Do. do. 5-light sash.		
						1		
						—		

[NOTE.— When Painter is taken from Joiner, Smith, &c., dimensions are often divided by 8 and the result added to the total to allow for edges, &c.]

ENTRANCE LODGE (*continued*)

FAIR BILLS

SHOWING THE ITEMS COLLECTED FROM FOREGOING ABSTRACT.

NOTE.—In practice it is advisable to amplify the preambles to each trade, and to make reference to any peculiarities of the site, or special materials used, and of any special methods of construction.

Estimate for Proposed Entrance Lodge to be erected at _____ Road _____, for _____, under the superintendence and to the entire satisfaction of _____

Architects.

.....192....

No. 1, PRELIMINARY.

The site is on the —— side of the entrance road leading from —— Road to the Manor House, and is within two miles of the nearest Railway Goods Depôt.

The building to be completed fit for occupation by the —— day of —— under a penalty of £—— per week as liquidated damages, delay consequent upon strikes only excepted.

In case of extra works, the time shall be extended one week for every £100 worth of additional work.

Payment will be made to the Contractor at the rate of 80 per cent. upon the value of the work executed until completion, when an additional 15 per cent. will be paid and the remaining 5 per cent. at the expiration of 6 months.

No part of the work to be let as task work.

A fully priced copy of the estimate is to be deposited with the architect within a week of signing the contract, extras and omissions to be valued at the prices of the contract, and any item of extra work which does not exactly agree with the descriptions of the original estimate to be valued at a price analogous thereto.

The contractor will be required to keep an approved foreman constantly on the works.

Allow for insurance from fire to the amount of tender and deposit the policy with the architect.

Samples of all materials intended for use to be submitted to the architect.

No extras whatsoever will be allowed unless the signed authority of the architect is obtained. This clause will be rigidly adhered to.

The contractor is expected to visit the site and to make himself thoroughly acquainted with the nature and extent of the work to be executed before tendering.

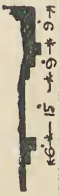
	£	s.	d.
Brought forward ..			
Allow for supplying water for all the works, including fees, temporary plumbing and storage of water.			
Allow for giving all notices to all Authorities requiring notice, and pay all fees.			
Area of Building:			
$5\frac{3}{4}$ squares, 2 stories high.			
$2\frac{1}{2}$ squares, 1 story high.			
Allow for all scaffolding, rods, &c., and stakes and labour in setting out works.			
Allow for an office for Clerk of Works, and the requisite firing, light and attendance, and for all sheds, &c., required for materials.			
Allow for enclosing the site with an approved post and rail fence, and for preventing the men trespassing on any other part of the ground than that enclosed.			
Allow for covering the walling during inclement weather, and provide for any other requisite protection.			
Allow for the removal, alteration, and making good of all mains, whether of gas, water, or electricity, &c., that may be exposed by these works.			
Allow for making good any injury to the building from any cause, and for making good pointing after injury by frost.			
Allow for any necessary watching and lighting.			
Allow for making good all damage done to the adjoining premises.			
Allow for erecting, maintaining, and altering as may be required a proper hoarding with all necessary gates, fastenings, &c. to the satisfaction of the Local Authorities, with proper returned ends, length of front —— feet.			
Allow for keeping the works in proper repair for —— months after completion, and for making good any defects or imperfections that may arise during that period.			
Allow for clearing away all dirt or rubbish and superfluous materials as they accumulate, and for twice scrubbing all floors at completion, and for leaving the whole of the premises clean, and for levelling up at completion round the building ..			
Carry to Summary, page 382.. £			

No. 2 EXCAVATOR AND DRAINS.

yds.	ft.	in.			£	s.
				Remove all garden ground to a distance of 30 yards, and stack for use.		
				The concrete to be composed of 1 of Portland cement to 6 of clean, sharp gravel.		
				The cement to be the best quality Portland cement, and to be of an improved manufacture.		
				The drain-pipes to be of Doulton's London made or other approved make, and to be tested; the joints to be formed with Portland cement.		
33	15	0	cube	Dig, remove, part fill in, and ram to footings, and cart away surplus, about ½		
41	9	0	,,	Dig, and cart away		
115	5	0	sup.	Dig, remove surface soil 9″ deep, and stack at a distance of 30 yards		
	28	0	run	Dig for ¾″ service pipe average 2 feet deep, and part fill in and ram solid, and remove surplus		
	161	0	,,	Dig for 4″ glazed stoneware pipe, average 3′ 6″ deep, and part fill in and ram solid, and remove surplus		
	58	0	,,	Do. 6″ do. do. do. do.		
33	15	0	cube	Portland cement concrete in footings, 1 of P. C. to 7 of clean gravel or Thames ballast		
11	6	0	sup.	Do. do. under floor 6″ deep of do. do.		
53	2	0	,,	Do. do. as above, 6″ deep, but with 1″ float of Portland, 1 to 2 of sand on same, and laid to fall for tiles and wood floor		
	161	0	run	Portland cement concrete 1 to 7, 6″ deep, laid to fall in trench for 4″ drain		
	58	0	,,	Do. do., but for 6″ drain		
	161	0	,,	4″ glazed stoneware drain pipes (tested), laid to fall, and jointed as described		
	58	0	,,	6″ do. do. do. do.		
		No.		6″ stoneware gulleys (Doulton's) with iron grids and 4″ outlet		
		,,	1	6″ do. do., but with 6″ do.		
		,,	8	Extra only to 4″ bends		
		,,	5	,, ,, 4″ junction off 4″		
		,,	1	,, ,, 4″ ,, ,, 6″		
		,,	1	,, ,, taper pipe 6″ to 4″		
		,,	1	,, ,, to 6″ P. trap		
		,,	1	,, ,, to inspection syphon 6″ with cover complete		
		,,	1	All labour and materials in digging for and forming inspection chamber in 9″ brickwork in cement faced with glazed bricks and finished at bottom with cement floated surface, and having half-glazed pipes, with all junctions, &c., and making good to inside of chamber, and fitted with W. I. cover with patent air-tight joint		

Carried forward .. £

					£ s. d
				Brought forward ..	
				complete, including also a Kenon syphon and 2 junctions of 6″ off 6″ and one of 4″ off 6″ in half pipes. The I. C. to be 3′ × 2′ internally and 3′ 6″ deep.	
				Attend upon all trades, and leave all perfect at completion	
				Allow for testing drains at completion to the satisfaction of the architect and the local authorities.	
				Allow for cutting away for making good, and attendance upon all other trades.	
				Carry to Summary, page 382 £	
				No. 3 BRICKLAYER.	
				The bricks to be good sound hard stocks, in mortar, laid to English bond.	
				The facings to be selected best red kilns of " Brown's " or other approved make.	
				The mortar to be composed of 1 of Blue Lias to 3 of clean sharp sand.	
rods	ft.	in.			
11	221	0	sup.	Reduced stock brickwork, as above described, in mortar in footings, walls,&c.	
	26	3	,,	Reduced stock brickwork, as before described, but circular on plan ; radius 4ft.	
	23	7	,,	Reduced stock brickwork in sleeper walls, built open	
	17	0	,,	½ brick trimmer arch in cement, including all use and waste of centering ..	
yds.					
18	6	0	,,	6″ × 6″ tile paving 1″ thick (red, best quality) laid diagonally	
	215	2	,,	Damp proof course of 2 courses of slate in cement	
	77	3	,,	Extra only to splayed fair cutting to brickwork	
				Facings.	
	2640	10	sup.	Extra only to facing of selected red facing, as before described over stocks.	
	53	3	,,	Do. do., but circular on plan, small radius	
	10	0	,,	Extra only to facing of white glazed bricks, best quality over stocks	
	82	10	,,	Extra only in gauged semi-circular arches in red facing, as before described	
	15	3	,,	Do. do., but segmental do. do. ..	
	1	11	,,	Do. do., but circular on plan	
	3	9	,,	Do. to fair cut to skewbacks in red facings	
				Carried forward .. £	

ft.	in.			£	s.	d.
			Brought forward ..			
131	8	run	Extra only to circular cutting to facings ..			
3	3	„	Extra only to circular cutting on circular facing			
15	0	„	Extra only to brick on edge coping in red facings, and tile creasing in cement ..			
10	0	„	Do. do., but circular			
17	9	„	Do. to brick on edge sill 4½" on face in face bricks, and tile creasing in cement ..			
3	6	„	Do. do., but circular on plan			
8	0	„	Do. to sill as above, but straight, and 14" wide, and double chamfered			
147	0	run	Do. to moulded plinth, as sketch.			
6	0	run	Do. do., but circular on plan (small radius)			
	No.	37	Extra only to mitres to do.			
	„	2	Do. irregular do. do.			
	„	5	Do. stopped and mitred ends do. do.			
	„	2	Do. to mitre of circular with straight do.			
ft.	in.					
12	6	run	Extra only to labour in forming chimney stack as plan in face bricks A			
10	0	„	Do. do., but on plan, thus, do. B			
	No.	1	Extra only to forming cap to plan A of section, thus, for 2 flues in face bricks. 			
	,	1	Do. do. to do. do. B. do. do. 3 flues,			
		3	Do. to forming tumbling in courses, as sketch, 14" on face.			
			Carried forward ..	£		

				£ s. d.
			Brought forward ..	
			ROUGH ARCHES.	
	No.	1	Extra only to labour in forming rough brick relieving arch to 1′ 6″ opening with 4½″ soffit	
	„	1	Do. do., but 2′ 6″ opening, and 1B soffit ..	
	„	2	Do. do., but 2′ 6″ do., and 1½B do.	
	„	2	Do. do., but 2′ 9″ do., and ½B do.	
	„	2	Do. do., but 2′ 9″ do., and 1B do.	
	„	4	Do. do., but 3′ 0″ do., and 1B do.	
	„	3	Do. do., but 3′ 6″ do., and 1B do.	
	„	1	Do. do., but 4′ 0″ do., and ½B do.	
	„	2	Do. do., but 5′ 6″ do., and 1B do.	
	„	1	Do. do., but 8′ 6″ do., and 1B do.	
ft.	in.			
42	6	run	Extra only to beam filling to 1B wall in stocks in mortar	
115	0	„	Wedge and point in cement to cover flashings	
55	0	„	Do. do., to step do.	
	No.	2	Cut away through 1B wall and make good for overflow pipe	
	„	6	Do., through 1B wall and make good for 3″ R.W.P.	
	„	7	Do., through 1B wall for outlets from cesspools	
	„	2	Build piers to sink 2′ 3″ × 1′ 6″ × 4½″, in white glazed bricks	
	„	10	Frames, bed and point in lime and hair mortar	
	„	3	Do. do. (large do.)	
	„	4	Air bricks, fix and form openings through wall	
	„	6	Flues, parge and core	
	„	6	Red ware chimney pots, 18″ high, provide and fix	
	„	1	Doulton's stoneware sink, 2/3 × 1/6, provide and fix in cement	
	„	5	Chimney pieces set	
	„	4	Stoves set	
	„	1	Range do.	
	„	1	Copper do.	
			Provide the P.C. sum of £ for 5 tile hearths, and add for labour and materials of laying, including cement float	
			Attend upon all trades and leave all perfect at completion.	
			Carry to Summary, page 382, £	

No. 4, TILER.

sqs.	ft.	in.			£	s.	d.
				The tiling to be the best quality Broseley, laid to a 3½" gauge, each tile to be secured with 2 compo nails			
15	87	0	sup.	Tiling to roof as above described			
7	73	0	„	Vertical lining to walls as above			
3	26	0		Extra only over plain vertical of ornamental tiling.			
	48	6	run	Do. of special valley tiles			
	28	0	„	Do. of special angle tiles for vertical tiling			
	35	0	„	Do. to cutting of vertical lining for feet of rafters			
	38	0	„	Do. to cutting roof tiling round angle chimney			
	136	6	„	Cement pointing to verges			
	59	0	„	Ridge tiling P.C. 1/6 per foot dowelled and fixing			
		No.	2	Extra only to labour in forming opening in vertical tiling, opening 6" wide and 1' 6" high.			
		„	1	Make good round ventilation pipe where carried through roof			
				Leave all perfect at completion, and make good after all trades			
				Carry to Summary, page 382 .. £			

No. 5, MASON.

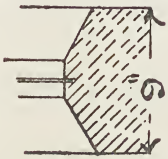
The stonework to be the best of its several kinds, free from all imperfections, and be laid on its natural bed.

Box Ground Bath Stone.

ft.	in.			£	s.	d.
15	2	cub.	In Box Ground Bath stone			
22	1	sup.	Sawing			
27	5	„	In plain face and beds and joints			
			Carried forward .. £			

ft	in.			£	s.	d.
			Brought forward ..			
16	6	run	Labour to forming double chamfered jamb, as sketch A			
3	6	„	Do. to forming do., but head, as sketch B.			

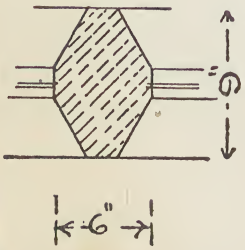
A.



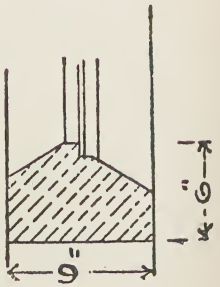
B.

4	6	run	Do. do., to forming chamfered mullion, and transome as sketch, C			
4	0	„	Do. do. to forming sill, as sketch D			

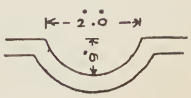
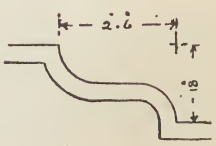
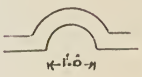
C.



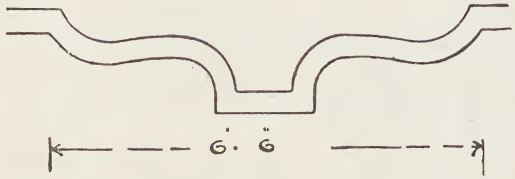
D.



	No.	2	Extra only to mitred angles of jamb and head			
	„	1	Do. to do. of mullion with head			
	„	4	Do. to mitred intersection of jamb and mullion to cell			
	„	2	Do. to mitred intersection of jamb to transome			
	„	4	Labour to forming mortices for dowels ..			
	„	2	Slate dowels to do.			
			Carried forward .. £			

			Brought forward	£	s.	d.
			York Stone.			
ft.	in.					
25	6	run	3″ × 9″ rough hard York core			
51	0	„	Extra only to tooled edge			
	No	1	Hard York tooled template 14″ × 14″ × 3″			
	„	2	Do. do., with rounded corners			
			Portland Stone.			
13	2	run	Stone cill 4″ × 10″ tooled on 3 faces ..			
23	0	„	Do. 6″ × 14″ do. and on end			
78	9	„	Coping 4″ × 14″ twice throated and weathered to rear (measd. nett.)			
	No	9	Extra only to mortices in cills			
	„	8	Ends of stone cills cut and pinned			
	„	7	Extra only to mitred angles to 4″ × 14″ coping			
	„	2	Extra only to labour in forming coping ..			
						
	„	2	Extra only to labour in forming ramp to coping			
						
	„	1	Extra only to labour in forming break in coping			
						
			Carried forward ..	£		

			£	s.	d.
		Brought forward ..			
No.	1	Do. to labour in forming coping			



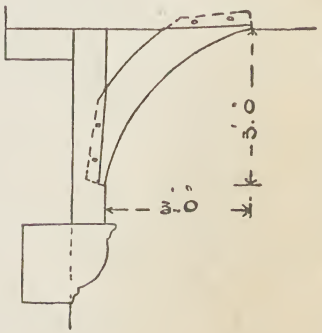
No.	1	Do. do., but 9′ 6″			
,,	2	Spur stones 2′ 6″ × 14″ × 9″ with rounded top and fixing			
,,	4	14″ × 9″ × 6″ tooled template, including all sinkings for gate hinges and fixing ..			
,,	4	Moulded corbels, each 18″ × 14″ × 6″ and moulded to detail.			
		Provide the sum of £ for two mantel pieces			
		Attend upon all trades			
		Allow for cleaning down at completion, and leaving all perfect.			
		Carry to Summary, page 382 .. £			

No. 6, CARPENTER.

The timber to be the best Memel Riga or Dantzic, free from all defects.

ft.	in.	cube		£	s.	d.
57	8	,,	Fir in plates and lintels			
1	6	,,	Do. do., but circular on plan			
11	10	,,	Do. in ground floor joists			
18	0	,,	Do. in Brestsummers, sawn, reversed, and bolted			
10	6	,,	Do. in curved truss under beam			
63	0	,,	Do. framed in floors			
150	10	,,	Do. do. in roof			
10	4	,,	Do. do. in quarter partition			
2	10	,,	Do. do. in small pieces, in joists cut to rake to give fall for flat			
			Carried forward .. £			

	ft.	in.		Brought forward ..	£	s.	d
	619	4	sup.	Extra only to planing on fir			
	40	3	,,	Firring and ¾" boarding to flats in small pieces			
sqs.	55	9	,,	¾" gutter board and proper bearers			
12	72	0	,,	¾" rough boarding to roof and ¾" battens spaced for tiling			
7	49	0	,,	¾" battens and plugging to wall for vertical tiling			
	33	0	,,	1¼" deal wrot. double beaded and tongued lining to girder			
	19	0	,,	1" wrot. one side and beaded casing to pipes secured by screws			
	32	6	,,	¾" wrot. one side and matched casing to cistern, including all blocking pieces, &c.			
	26	0	,,	Do. do., but ledged as door in do.			
	416	9	run	Labour to forming small chamfer in fir ..			
	24	0	,,	Rough bracketing to R.I.J., 10" deep ..			
	35	0	,,	Labour to forming moulded plate to detail 6" × 3"			
	4	0	,,	2" rounded roll to flat			
	8	6	,,	Rebated drip to do.			
	83	6	,,	3" × 1" rough tilt fillet to roof			
	91	6	,,	Do. to vertical tiling			
		No.	4	Extra only to labour in forming truss to underside of beam as sketch			



	,,	56		Do. in forming cut ends to rafters, and planing to do.			
	,,	7		Do. to forming cesspool heads in gutters ..			
	,,	84		Do. to stops to chamfer			
	,,	164		Wright & Co's. patent fixing blocks			
				Carried forward .. £			

					£	s.	d
				Brought forward ..			
				BARGE BOARDS.			
	ft.	in.					
	149	9	sup.	$2\frac{1}{4}$″ × 12″ deal wrot. and double chamfered barge board			
	143	6	run	3″ × $3\frac{1}{2}$″ deal moulded verge			
		No.	11	Extra only to cut ends to barge boards ..			
		,,	5	Do. to mitred junction at ridge			
		,,	12	Do. to housing plate to barge board ..			
		,,	5	Do. to do. ridge to do.			
				CENTERING AND TURNING PIECES, USE AND WASTE OF.			
			1	Turning pieces to 3′ 6″ opening, $4\frac{1}{2}$″ soffit. *Circular on plan*			
		,,	1	Do. to 2′ 9″ do. $4\frac{1}{2}$″			
		,,	3	Do. to 3′ 0″ do. $4\frac{1}{2}$″ do. .. not circular			
		,,	1	Centering to 3′ 9″ do., $4\frac{1}{2}$″ do. do. ..			
		,,	2	Do. to 4′ 0″ semicircular do., 14″ do. do.			
		,,	1	Do. to 8′ 6″ do., 2′ 0″ do.			
				Allow for attendance upon all other trades and making good at completion			
				Carry to Summary, page 382 .. £			
				NO. 7, JOINER, PRELIM.			
yds.	ft.	in.					
34	1	0	sup.	3″ wrot. deal wood block flooring, laid herringbone on, and including layer of bitumen $\frac{3}{4}$″ thick			
sqs.							
4	45	0	,,	1″ deal wrot. flooring, straight joint laid, folding in narrow widths, with splayed headings			
1	61	0	,,	$1\frac{1}{4}$″ yellow deal floor in batten widths, tongued in iron			
2	29	0	,,	1″ deal wrot. 1 side and jointed boarding for staining			
	7	3	run	3″ deal mitred margin to wood block flooring			
	18	6	,,	2″ cut and mitred margin to 1″ floor ..			
	6	10	,,	$1\frac{1}{4}$″ do. do. to $1\frac{1}{4}$″ do.			
	44	6	,,	$1\frac{1}{4}$″ × 10″ deal wrot. and moulded skirting with proper grounds			
	3	6	,,	Do. do., but circular on plan			
	126	3	,,	$1\frac{1}{4}$″ × 7″ deal wrot. torus moulded skirting and grounds			
				Carried forward .. £			

				£ s. d.
			Brought forward ..	
	No.	3	Extra only to mitres of $1\frac{1}{4}'' \times 10''$ skirting	
	,,	15	Do. do. to $1\frac{1}{4}'' \times 7''$ do.	
	,,	6	Do. to mitred and retd. ends of $1\frac{1}{4}'' \times 10''$ do.	
	,,	22	Do. do. $1\frac{1}{4}'' \times 7''$ do.	
	,,	4	Do. to irregular mitres of $1\frac{1}{4}'' \times 10''$ do. ..	
	,,	10	Do. do. $1\frac{1}{4}'' \times 7''$ do.	
	,,	2	Do. to small circular angles of $1\frac{1}{4}'' \times 10''$ skirting	
	,,	6	Do. mitres of straight to circular in $1\frac{1}{4}'' \times 10''$ skirting	
ft.	in.			
9	8	cube	Fir in wrot., rebated and chamfered door frame	
3	7	,,	Do. do., but moulded and with transome ..	
5	0	sup.	1" deal wrot. and ledged trap door	
26	2	,,	$1\frac{1}{2}''$ do. 2 panel high in cupboard doors, moulded one side and hung folding ..	
32	6	,,	$1\frac{3}{4}''$ deal wrot. ledged and braced door ..	
16	3	,,	$1\frac{3}{4}''$ do. 4 panel door, square both sides ..	
16	3	,,	$1\frac{3}{4}''$ do. 4 panel door, moulded 1 side and square other	
71	1	,,	$1\frac{3}{4}''$ do. 4 panel doors, moulded both sides	
17	9	,,	2" deal wrot. 4 panel, moulded one side and bead flush other	
16	3	,,	2"3 panel door 2 panels high, upper glazed in 20 squares	
61	6	,,	$2\frac{1}{2}''$ deal wrot. and panelled gates hung folding, panels filled in with $1\frac{1}{4}''$ beaded and tongued boarding	
16	6	,,	$1\frac{1}{4}''$ tongued and glued cupboard shelves	
33	10	run	$1\frac{1}{4}''$ deal wrot., beaded and rebated lining	
66	5	,,	$1\frac{1}{4}''$ do. do. double rebated do.	
21	11	,,	$1\frac{1}{4}''$ do. do. and panelled bead butt do.	
10	9	,,	3" moulded and grooved capping to gates	
185	11	,,	$\frac{3}{4}'' \times 3''$ deal wrot. and splayed grounds ..	
12	2	,,	Do. do., circular on plan	
290	11	,,	$3'' \times 9''$ deal wrot. and moulded architrave	
13	2	,,	Do. do., but circular on plan	
67	6	,,	$1'' \times 2\frac{1}{2}''$ deal wrot. and chamfered architrave	
6	2	,,	$2\frac{1}{2}'' \times 2\frac{1}{2}''$ do. angle moulding	
13	0	,,	$3\frac{1}{2}'' \times 3\frac{1}{2}''$ do. do.	
6	0	,,	$\frac{3}{4}'' \times 2''$ deal wrot. and chamfered fillet under shelving	
	No.	2	Extra only to labour in forming ramp to gate capping	
	,,	2	Do. to mitres to $2\frac{1}{2}''$ angle do.	
	,,	8	Do. to do. to $1'' \times 2\frac{1}{2}''$ chfd. do.	
	,,	38	Do. to do. to 3" architrave	
	,,	2	Do. to do. to $3\frac{1}{2}'' \times 3\frac{1}{2}''$ do.	
			Carried forward .. £	

ft.	in.			£	s.	d
			Brought forward ..			
			SASHES AND FRAMES.			
7	5	cube	Fir wrot. in double chamfered and rebated casement frame without transome			
9	9	"	Do. do., but with transome			
1	11	"	Do. do., but circular on plan			
3	8	"	Oak sunk weathered and throated sill ..			
2	9	"	Do. do. circular on plan (measured nett) ..			
3	8	"	Do. in sunk weathered throated and molded sill (projecting)			
26	7	sup.	2" wrot. deal casement sashes in very small squares, fixed			
89	7	"	2" do. do., but hung			
11	3	"	2" do. do., but circular on plan			
5	4	"	2" moulded and fixed fanlight sash			
86	9	run	1" × 7" deal, wrot. 1 side and splayed linings rebated and beaded			
11	6	"	Do. do., circular on plan			
37	3	"	$1\frac{1}{4}$" × 9" deal wrot. rebated and rounded window board			
2	6	"	Do. do., but circular on plan			
	No.	14	Mitred and returned ends to window board			
	"	6	Mitred and returned ends to moulded oak sill			
			Provide in the estimate the sum of £25 to be used as may be directed, or if not used to be deducted			
			STAIRCASE.			
29	3	sup.	$1\frac{1}{4}$" deal wrot. tongued and glued in landing			
45	8	"	$1\frac{1}{2}$" deal wrot. and moulded treads with 1" deal wrot. and rebated risers			
14	3	"	$1\frac{1}{2}$" do. in feather tongd. winder and riser			
11	6	"	$1\frac{3}{4}$" deal wrot. and beaded outer close string			
30	3	"	$1\frac{1}{2}$" do. and flush beaded wall string			
20	8	"	$1\frac{3}{4}$" deal wrot. and moulded one side, and framed spandril framing 3 panels high ..			
5	0	"	$\frac{3}{4}$" wrot. and beaded apron lining .. .			
82	6	run	1" × 1" deal wrot. square bar ballusters and fixing			
16	6	"	2" × 3 deal wrot. moulded and grooved capping			
27	0	"	$4\frac{1}{2}$" × $4\frac{1}{2}$" deal wrot. moulded and turned newel			
16	6	"	$2\frac{1}{2}$" × 3" moulded mahogany handrail to detail and French polished			
			Carried forward .. £			

ft.	in.			£	s.	d.
			Brought forward			
13	0	run	$\frac{3}{4}$″ × 9″ deal wrot. and moulded skirting to match string			
12	6	,,	Extra only to labour in forming nosing to 1″ floor			
	No.					
	,,	30	1″ square ballusters, fix to string and hand-rail			
	,,	13	Extra only to ramps to string			
	,,	2	Do. to stopped and returned ends to skirting			
	,,	1	Do. to labour in forming door in spandril framing			
	,,	6	Do. to turnings to newels to detail ..			
	,,	6	Do. to do. to moulded heads do.			
	,,	6	Do. do. drops do.			
	,,	22	Do. housings of treads and risers to string			
	,,	6	Do. do. winders to string			
	,,	6	Do. do. to newel			
	,,	1	Do. do. quarter space to string			
	,,	1	Do. do. to newel			
	,,	1	Provide and hang step ladder 8′ 6″ long, and fitted with iron hooks at end, and staples to floor			
			Attend upon all trades, and leave all perfect at completion			
			Carry to Summary, page 382.. £			
			No. 8, IRONMONGER.			
			To include all screws and fixing specimens to be deposited for approval before fixing.			
	No.	22	Pairs of $2\frac{1}{2}$″ wrot. iron butts			
	,,	10	Do. 3″ do.			
	,,	1	Do. $3\frac{1}{2}$″ do.			
	,,	4	Do. 12″ T hinges			
	,,	2	Do. 3′ 6″ patent (Colling's) gate hinges ..			
	,,	4	Cupboard bolts			
	,,	3	6″ barrel bolts with brass knob			
	,,	5	10″ do. do.			
	,,	2	12″ do. do.			
	,,	2	12″ Norfolk latches			
	,,	1	Cupboard lock			
	,,	3	6″ rim locks and approved brass furniture			
	,,	5	6″ mortice locks and approved copper furniture, P.C. 15s.			
	,,	1	Night latch, P.C. 15s., complete with 2 keys			
	,,	18	Approved gun metal cock-spur casement fastening			
	,,	20	Do. special stay bars to casement sashes			
			Carried forward .. £			

					£	s	d.
				Brought forward			
		No.	2	Do. do., to transome lights			
		,,	1	Knob to front door, P.C. 2*s.* 6*d.*			
		,,	1	Approved flap stop to folding gates			
		,,	1	Approved stay bar ¾″ diam., 6 feet long, with hook and eye complete			
		,,	1	Drop handle and gate latch, P.C. 7*s.* 6*d.*, to approval			
		,,	1	Knocker, P.C. 5*s.*, and fix			
		,,	2	Wrot. iron brackets 14″ × 12″ to shelf ..			
		,,	4	Iron shoes to solid door frames			
		,,	1	2½″ iron button			
				Ease and adjust all fastenings, and leave perfect at completion			
				Carry to Summary, page 382 .. £			

No. 9, SMITH AND FOUNDER.

				The rolled iron joists to be of the sections shown on plan, and to be obtained from			
cwt.	qr.	lbs.		an approved manufacturer.			
10	1	25	Wt.	Wrot. iron in riveted girders, including hoisting and fixing			
	1	21	Wt.	Wrot. iron in chimney bars, with split ends			
		No.	8	Drillings to R.I.J. for ½″ bolts			
		,,	8	½″ bolts and nuts, 9″ long			
		,,	10	Do., but 11″ long to wood bressummer ..			
		,,	1	Angle plate 7″ long and drilling and ⅜″ bolts and nuts (4)			
		,,	1	Extra only to labour in connecting 2 R.I.J. 8″ × 5″ and top plate			
	ft.	in.		Wrot. iron moulded sashes, with 1½″ bar			
	15	0	sup.	special pattern in small squares, fixed			
	8	4	,,	Extra only to portion of above, hinged to open, and to include fastenings and hinges complete (2 sets)			
	54	0	run	4½″ cast iron moulded eaves gutter			
		No.	12	Extra only to stopped ends to do.			
		,,	7	Do. to outlets to do.			
		,,	12	Do. to joints and clips			
	105	6	run	3″ square cast iron rain water pipe			
				Carried forward .. £			

				£ s. d.
			Brought forward	
	No.	3	Extra only to swan necks	
	,,	9	Do. to shoes	
	,,	6	Do. to bends to plinth	
	,,	3	Do. to do. to vertical tiling	
	,,	34	Do. to joints and ears to R. W. P.	
	,,	7	Do. do. on vertical tiling	
	,,	12	Do. to heads to R. W. P.	
	,,	1	Provide the sum of £2 for special head and shoot to R. W. P., and add for profit and fixing	
41	0	run	3″ galvanised ventilation pipe	
	No.	5	Extra only to bends to do	
	,,	1	Mica flap fresh air inlet to do	
	,,	1	Boyle's patent 3″ exhaust cowl	
	,,	4	Wrot. iron air bricks, 9″ × 6″	
	,,	1	Set of copper furnace bars and fittings complete	
	,,	1	12-gallon galvanised copper and fixing ..	
	,,	1	Provide in the estimate the P. C. sum of £ for stoves and range, and add for carriage and fixing	
	,,	2	Provide in the estimate the P. C. sum of £1 5s. each for finials, and add for delivery and fixing	
	,,	1	Provide and fix, including hoisting, a galvanised iron tank 6′ 0″ × 3′ 0″ × 4′ 0″	
	,,	1	Provide and hang complete a large bell with drop pull, P. C. 10s., bell to be fixed to ring in hall	
	,,	1	Attend upon all trades, and leave all perfect at completion.	
			Carry to Summary, page 382 .. £	

No. 10, PLASTERER.

The sand to be clean and sharp, free from salt or clay, and washed if directed.

The lime to be the best chalk lime, that for the setting coat to be run into putty at least 1 month before required for use.

The hair to be the best long hair, and to be well beaten.

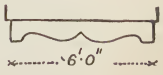
The laths to be the best rent laths, butted at joints, and the joints frequently broken.

The Portland cement for external work to be from an approved manufacturer, and

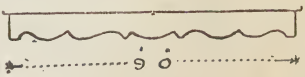
Carried forward . £

					£	s.	d.
	ft.	in.		Brought forward			
				to be mixed in the proportion of 1 of cement to 2 of washed sand.			
				Contractor to include for all bracketing, &c.			
yds.	ft.	in.					
198	6	0	sup.	Render float, and set in lime and hair mortar			
1	8	0	„	Do. do., but circular on plan			
85	3	0	„	Lath plaster float and set to ceilings, and twice whiten			
4	6	0	„	Do. do. in soffits			
2	3	0	„	Do. do., but circular			
9	5	0	„	Lath plaster float and set on quarter partitions			
18	5	0	„	Point and twice limewhite on walls ..			
210	2	0	„	Size and twice colour to walls and partitions			
	56	3	run	6″ plaster moulded cornice to detail ..			
	6	6	„	Do. do., but circular			
		No.	3	Mitres to 6″ cornice			
		„	6	Irregular mitres to do.			
		„	4	Mitres of circular to straight			
	16	0	run	Extra only of angles in Keene's cement on backing of Portland			
	24	0	„	Do. circular angles in Keene's of small radius on do. do.			
	17	0	„	Extra only to angles of Keene's double beaded 18″ wide on backing of Portland			
	18	0	„	Do. do., but in narrow widths			
yds.							
12	4	0	sup.	Portland cement rendering to wall, finished with trowelled face			
	4	0	„	Do. do., but in small pieces			
	12	1	„	Do. do., circular in do.			
	13	0	run	Do. do., under 6″ wide, and arris to window			
	4	3	„	Extra only to circular arris			
	20	9	„	Do. to bead and quirk in Portland cement			
		No.	6	Mitres to do.			
		„	4	Stopped ends to do.			
	35	6	run	6″ square Portland cement skirting			
		No.	2	Mitres to do.			
		„	4	Irregular mitres to do.			
		„	8	Stopped ends to do.			
				Attend upon all trades, and leave all perfect at completion.			
				Carry to Summary, page 382 .. £			

cwt.	qrs.	lbs.		No. 11, PLUMBER.	£ s. d.
				To include all soldered joints, wall hooks, &c., necessary for the due execution of the works. The water supply to be executed in accordance with the regulations of the water company, and to the satisfaction of their inspector.	
12	3	13½	Wt.	Milled lead, laid complete in gutters and flats	
4	0	2	,,	Do. do., in cover flashings and sides of dormer	
3	2	2½	,,	Do. do., in step flashing	
1	1	10	,,	Do. do., in lead safe	
	2	0	run	Soldered angle	
		No. 7		Extra only to labour in forming cesspool head, and labour and materials in 3″ outlet 18″ long from gutter, including 2 bends	
		,, 1		Do. to end of roll bossed	
		,, 2		Do. to labour in forming dots to sides of dormer	
		No. 1		Extra only to labour in forming lead apron to detail	



		,, 1		Do. do., but 4′ 0″, not 6′ 0″	
		,, 1		Extra only to labour in forming lead apron to detail 9 feet in length	



		,, 1		Extra only to labour in forming flashing round chimney on plan	

Carried forward ,, £

				£ s. d.
			Brought forward	
	No.	2	Do. to labour in forming flashing to detail round chimney, as sketch	
	,,	1	Extra only to labour in forming flashing to base of finials, as sketch	
ft.	in.			
10	0	run	$\frac{1}{2}$" lead supply pipe (strong)	
94	0	,,	$\frac{3}{4}$" ,, service pipe (strong)	
8	0	run	$1\frac{1}{2}$" lead light supply	
	No.	1	$\frac{3}{4}$" brass screw-down bib tap	
	,,	2	$\frac{3}{4}$" ,, stop cocks	
	,,	1	$\frac{3}{4}$" ,, ball ,, ...	
	,,	2	$\frac{3}{4}$" unions and drilling to cistern	
	,,	1	Make good through roof and flash around	
	,,	11	Wire domes (galvanised)	
	,,	1	Guard to gutter	
	,,	1	Provide and fix 1" light lead overflow to safe 18" long, and including all joints ..	
	,,	1	Drill for and fix $1\frac{1}{2}$" light lead overflow to cistern 1' 6" long, with all bends complete	
	,,	1	Provide for and pay fees for connection to main, including all digging and filling in, and stop cock, &c., complete	
	,,	1	Allow for fixing w.c. apparatus complete, and joint of flushing pipe, &c.	
	,,	1	Allow in the estimate the P.C. sum of for w.c. apparatus, and add for carriage and profit	
	,,	1	Allow in the estimate the P.C. sum of 1*l.* 5*s.* for approved syphon, water waste cistern, and fixing, including iron brackets, and pinning into wall	
	,,	1	Attend upon all trades. Leave all perfect at completion.	
			Carry to Summary, page 382, £	

					£	s.	d.
				No 12, GLAZIER.			
				The whole of the glass to be the best of its several kinds, free from defects, and to			
	ft.	in.		be well puttied and back puttied			
	86	9	sup.	21 oz. sheet glazing in small squares, average 6″ each way			
	13	6	,,	Do. do., glazed in iron sashes			
	2	1	,,	21 oz. ground glass in wood sashes in very small squares			
	11	6		21 oz. glazing in small squares to door, but beaded in			
		No.	14	Glass tiles in roof and fixing			
				Leave all clean and perfect at completion			
				Carry to Summary, page 382 .. £			
				No. 13, PAINTER.			
				All work to be properly cleaned, rubbed down, knotted, and stopped.			
				The oil colours to be made of the best			
yds.	ft.	in.		white lead and pure linseed oil.			
8½			sup.	Paint 3 coats oil, common colours, on iron-work			
	15	0	,,	Do. two sides to wrot. iron sashes			
	54	0	run	Do. inside and out to 4½″ eaves gutter ..			
	105	6	,,	Do. do. to 3″ square C. I. rain water pipe			
	4	10	,,	Do. do. to chimney bars			
		No.	4	Do. W. I. air bricks			
		,,	13	Do. to heads to R. W. P.			
		,,	4½	Doz. squares, paint 3 oils, 2 sides			
		,,	4	Stoves black			
		,,	1	Range do.			
		,,	2	Do. to finials on roof			
		,,	3	Extra only to paint 3 oils to swan neck ..			
		,,	9	Do. to do. shoes			
		,,	41	Extra only to paint 3 oils to joints and clips			
224	0	0	sup.	Knot, stop, prime, and paint 3 coats oil on wood			
33	2	0	,,	Do. do., on sashes and frames and linings			
29	1	0	,,	Size, stain, and twice varnish to linings and soffits			
	82	6	run	Knot, stop, prime and paint 4 oils to 1″ × 1″ square bar ballusters			
	128	6	,,	Do. do., to 3″ × 3½″ verge mould, cut in on 1 edge			
				Carried forward .. £			

ft.	in.			£	s.	d.
			Brought forward			
35	0	run	Do. do., to 3″ × 6″ moulded plate cut in on 2 edges			
126	3	,,	Do. do., to 1¼″ × 7″ skirting do.			
13	0	,,	Do. do., 9″ do.			
48	0	,,	Do. do., 1¼″ × 10″ do.			
25	3	,,	Do. do., wall string, 12″ deep do.			
16	6	,,	Do. do., capping, 9″ girth			
27	0	,,	Do. do., 4½′ × 4½″ newels, 4 sides			
176	0	,,	Extra only to labour in cutting in on 1 edge			
	No.	36⅙	Doz. squares small, knot, stop, prime and paint, 3 coats oil			
	,,	56	Ends of rafters, 18″ long, do. do.			
	,,	4	Door frames, do. do., both sides			
	,,	1	Small sash and frame do. do., one side ..			
	,,	2	One-light do., and transome do. do.			
	,,	3	Two-light casement frames, knot, stop, prime and paint 3 coats oil			
	,,	2	Do. do., but with transome lights			
	,,	1	3-light do. do., but without transome ..			
	,,	1	5 do. do., do. do.			
			Attend upon all trades, and leave all perfect at completion.			
			Carry to Summary below .. £			

SUMMARY.

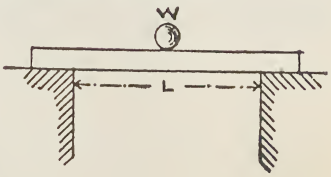
	No.	1	Preliminary .. ..
	,,	2	Excavator and Drains .. ..
	,,	3	Bricklayer .. ..
	,,	4	Tiler .. ..
	,,	5	Mason .. ..
	,,	6	Carpenter and joiner .. ..
	,,	7	Joiner .. ..
	,,	8	Ironmonger .. ..
	,,	9	Smith and founder .. ..
	,,	10	Plasterer .. ..
	,,	11	Plumber .. ..
	,,	12	Glazier .. ..
	,,	13	Painter .. ..
			£
			Add surveyor's charges for preparation of quantities, 2½ per cent. on above amount to be paid on receipt of first instalment
			Add for cost of lithography and expenses
			Carry to form of tender .. .. £

APPENDIX.

Formulas for obtaining Strength of Beams, Columns, etc.

Beams, cross section rectangular, supported at both ends.

b = breadth, d = length } in inches.
L = length in feet.
BW = breaking weight in cwts.



Load in the Middle.

$$BW = \frac{b\,d^2\,c}{L},$$

C being the constant in cwts.

C = 40·0 cast steel.
22·0 wrought iron.
18·0 cast iron.
10·0 brass.
6·0 ash, English.
5·0 „ American.
3·0 „ „ (black).
4·5 beech.
4·0 birch, black American.
5·0 blue gum, Australian.
3·5 cedar, West Indies.
3·0 elm, English.
3·6 fir, white spruce.
4·5 jarrah, Australian.
4·8 Kauri pine, New Zealand.
3·5 larch, English.
4·9 mahogany, Honduras.
5·0 „ Cuban.
5·0 oak, English.
5·2 , American white.
4·3 „ Baltic.
4·0 pine, Northern Dantzic and Memel.
3·5 „ „ Riga.
5·0 pitch pine, American.
4·0 red „ „
3·8 white „ „
5·0 teak, Burmah.

Note.—There should be a reduction of ¼ to ½ from the above values of C, where the wood beams are from large and unselected materials.

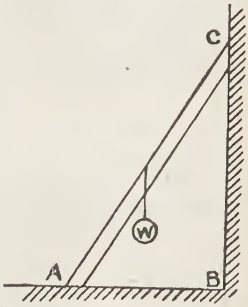
The strongest section of a wood beam is that having a proportion of 5 in breadth to 7 in depth.

The *factor of safety* for wood is $\frac{1}{6}$th the breaking weight for a stationary load; and $\frac{1}{7}$th the breaking weight for a moving load.

Beams in all cases will support double the load when distributed over the length that they would if placed on the middle.

Beams supported at both ends and loaded in the middle	= W
Beams supported at one end and fixed at other, the load on the middle	= W × $1\frac{1}{4}$
Beams fixed at both ends and loaded on the middle ..	= W × $1\frac{1}{2}$
Beams fixed at one end and loaded at other	= W ÷ 4

Inclined beams supported at the ends have their breaking weights equal to those of the horizontal beams, multiplied by the length A C, and divided by the horizontal distance A B.



Cast Iron Flanged Girders.

The sectional area of the top flange should not be less than $\frac{1}{6}$th the area of the bottom flange.

To prevent the upper flange from yielding first, its area should be increased to $\frac{1}{4 \cdot 6}$th of the bottom flange, this being the best proportion for stiffness if the load rests on the top, or on both sides of the bottom flange. If it rests on one side only the proportion should be $\frac{1}{3}$rd.

Formula. a = area of bottom flange in inches.
d = depth of girder in inches.
L = length of bearing in feet.
W = breaking weight in tons on the middle.

$$W = 2\,\frac{a\,d}{L}.$$

Wrought Iron and Steel Flange and Box Girders. Supported at both ends.

In girders with top and bottom flange, take a = area of flange in tension plus $\frac{1}{6}$th of area of web.

In built girders the horizontal table of the angle irons should be treated as flange and the vertical table as web.

Constants.		
C = 10·0 for R. S. J.	C = 6·5 for box girders.	
C = 7·0 „ R. I. J.	C = 7·0 „ rolled „	
C = 6·0 „ plate girders.	C = 4·0 „ T „	

a = area of tension or bottom flange = in inches.
d = depth in inches.
L = length in feet.
BW = breaking weight in tons on the middle.

$$BW = 2\frac{a\,d'}{L}.$$

Girders of Wood with Wrought Iron Flitches (Hurst).

The thickness of the iron flitch should be about $\frac{1}{12}$th that of the wood for fir and pine, and about $\frac{1}{10}$th for oak.

Constants. C = 4·0 teak.
C = 3·7 oak, English or Baltic.
C = 3·2 „ Canadian.
C = 3·0 Northern pine, Memel and Dantzic.
C = 2·8 American pine and spruce.
C = 2·2 elm.
b = breadth.
d = depth.
t = thickness of iron flitch. } *In inches.*
L = length of bearing in feet.
BW = breaking weight in cwts. on the middle.

$$BW = \frac{d^2}{L}(Cb + 30t)$$

Pillars of Cast Iron (Hodgkinson).

Ends flat and fixed. *When length exceeds* 30 *diameters.*

d = diameter in inches.
L = length in feet.
BW = crushing weight in tons.
d' = internal clear diameter.

$$\text{Solid pillars BW} = \frac{d^{3.5}}{L^{1.6}}.$$

$$\text{Hollow pillars BW} = 42\frac{d^{3.5} - d'^{3.5}}{L^{1.6}}.$$

When the ends are rounded take $\frac{1}{3}$ BW.
When length is less than 30 diameters,

obtain BW′ = crushing weight as above in tons.
S = sectional area of solid part of pillar in inches.
BW′ = crushing weight of short pillar in tons.

In hollow pillars the thickness of metal should not be less than $\frac{d}{12}$.

Then $$BW = \frac{36\,W\,S}{W + 27\,S}.$$

Mensuration.

Triangular Figures.

To find the Area of a Triangle.—Multiply the base by half the perpendicular.

To find the Solidity of a Prism.—Multiply the area of its end by its length.

Circular and Elliptical Figures.

To find the Circumference.—$2\ \pi\ r$.*

To find the Area.—$\pi\ r^2$.

To find the Surface of a Sphere.—$4\ \pi\ r^2$.

To find the Solid Contents of a Sphere.—$\frac{4}{3}\ \pi\ r^3$.

To find the Solidity of a Cylinder.—$\pi\ r^2\ \times$ by length.

To find the Area of Sector of a Circle.—$r\ \times\ \frac{1}{2}$ arc.

To find the Circumference of an Ellipse.—$\left(\frac{\text{Major axis} + \text{Minor axis}}{2}\right)\pi$.

To find the Area of an Ellipse.—$\left(\frac{\text{Major axis}}{2} \times \frac{\text{Minor axis}}{2}\right)\pi$.

To find the Solidity of a Pyramid.—Multiply the area of end by $\frac{1}{3}$ of the height.

To find the Solidity of the Frustum of a Cone.—Add areas of each end to square root of their multiplication, and multiply result by $\frac{1}{3}$ of the height.

To find the Solidity of a Prismoid.—Add into one sum the areas of the two ends + 4 times the middle sectional area, and multiply result by $\frac{1}{6}$ of the height.

To find the Deduction for a Groin Void.—Multiply the cube by ·904.

* $\pi = 3{\cdot}1416$.
r = radius of circle.

CIRCUMFERENCES OF CIRCLES.

Diam. In., ft., or yds.	Circumf.	Diam.	Circumf.	Diam.	Circumf.	Diam.	Circumf.	Diam.	Circumf.
1	3·14	5	15·70	9	28·27	13	40·84	17	53·40
¼	3·93	¼	16·49	¼	29·05	¼	41·62	¼	54·19
½	4·71	½	17·27	½	29·84	½	42·41	½	54·97
¾	5·50	¾	18·06	¾	30·63	¾	43·19	¾	55·76
2	6·28	6	18·84	10	31·41	14	43·98	18	56·54
¼	7·07	¼	19·63	¼	32·20	¼	44·76	¼	57·33
½	7·85	½	20·42	½	32·98	½	45·55	½	58·11
¾	8·64	¾	21·20	¾	33·7	¾	46·33	¾	58·90
3	9·42	7	21·99	11	34·55	15	47·12	19	59·69
¼	10·21	¼	22·77	¼	35·34	¼	47·90	¼	60·47
½	10·99	½	23·56	½	36·12	½	48·69	½	61·26
¾	11·78	¾	24·34	¾	36·91	¾	49·48	¾	62·04
4	12·56	8	25·13	12	37·69	16	50·26	20	62·83
¼	13·35	¼	25·91	¼	38·48	¼	51·05	¼	63·61
½	14·13	½	26·70	½	39·27	½	51·83	½	64·40
¾	14·92	¾	27·48	¾	40·05	¾	52·62	¾	65·18

AREAS OF CIRCLES.

Diam. In., ft., or yds.	Area.	Diam.	Area.	Diam.	Area.	Diam.	Area.	Diam.	Area.
1	0·7854	5	19·64	9	63·62	13	132·73	17	226·98
¼	1·23	¼	21·65	¼	67·20	¼	137·88	¼	233·70
½	1·77	½	23·76	½	70·88	½	143 14	½	240·53
¾	2·40	¾	25·97	¾	74·66	¾	148·49	¾	247·45
2	3·14	6	28·27	10	78·54	14	153·94	18	254·47
¼	3·98	¼	30 68	¼	82·52	¼	159·48	¼	261·58
½	4·90	½	33 18	½	86·59	½	165·13	½	268·80
¾	5·94	¾	35·78	¾	90·76	¾	170·87	¾	276·11
3	7·06	7	38·48	11	95·03	15	176·71	19	283·53
¼	8·29	¼	41·28	¼	99·40	¼	182·65	¼	291·04
½	9·62	½	44·18	½	103·87	½	188·69	½	298·64
¾	11·04	¾	47·17	¾	108·43	¾	194·82	¾	306·35
4	12·56	8	50·26	12	113·09	16	201·06	20	314·16
¼	14·18	¼	53·46	¼	117·86	¼	207·39	¼	322·06
½	15·90	½	56·74	½	122·72	½	213·82	½	330 06
¾	17·72	¾	60·13	¾	127·66	¾	220·35	¾	338·16

RELATIVE VALUE OF FRENCH AND BRITISH WEIGHTS, MEASURES, &c.

French.	WEIGHTS. CONTAINING	*British.*
Decamillier or Bar ..	10,000,000 grammes =	22050 pounds avoirdupois.
Millier	1,000,000 „ =	2205 „ „
Quintal	100,000 „ =	220·50 „ „
Myriagramme	10,000 „ =	22·050 „ „
Kilogramme	1,000 „ =	2·2050 „ „
Hectogramme	100 „ =	1543·4 grains „
Decagramme	10 „ =	154·34 „ „
Gramme	=	15·434 „ „
Decigramme or $\frac{1}{10}$ of a gramme	=	1·543 „ „
Centigramme or $\frac{1}{100}$ „	=	0·154 „ „
Milligramme or $\frac{1}{1000}$ „	=	0·015 „ „

French.	LENGTHS. CONTAINING	*British.*
Myriametre or . ..	10,000 metres =	10936 yards.
Kilometre or	1,000 „ =	1093·6 „
Hectometre or	100 „ =	109·36 „
Decametre or	10 „ =	10·936 „
Metre	=	39·371 inches.
Decimetre or	$\frac{1}{10}$ of metre =	3·9371 „
Centimetre or	$\frac{1}{100}$ of metre =	0·3937 „
Millimetre or	$\frac{1}{1000}$ of metre =	0·0393 „

French.	SUPERFICIES.	*British.*
Hectare or	100 ares =	11960 yards.
Decare or	10 ares =	1196·0 superficial yards.
Are	=	119·60 „
Deciare or	$\frac{1}{10}$ of are =	11·960 „
Centiare or	$\frac{1}{100}$ of are =	10·764 superficial feet.
Milliare or	$\frac{1}{1000}$ of are =	1·076 „

French.	CUBIC.	*British.*
Myrialitre	10,000 litres =	353·15 cubical feet.
Kilolitre	1,000 „ =	35·315 „
Hectolitre	100 „ =	3·531 „
Decalitre	10 „ ..	0·353 „
Litre	..	0·035 „
Decilitre	$\frac{1}{10}$ of litre.	
Centilitre	$\frac{1}{100}$ of litre.	
Millilitre	$\frac{1}{1000}$ of litre.	

RELATIVE VALUE OF BRITISH AND FOREIGN SQUARE AND CUBIC MEASURES.

(*English Square Foot* 144 *inches, ditto Cube Foot* 1728 *inches.*)

Country or Place.	Sq. Foot in English Sq. Inches.	Cubic Foot in English Cubic Inches.	Country or Place.	Sq. Foot in English Sq. Inches.	Cubic Foot in English Cubic Inches.
Amsterdam	124·255	1385·070	Lisbon ..	167·547	2168·728
Berlin ..	148·693	1813·162	Prussia ..	152·670	1886·390
Berne ..	133·287	1538·798	Rhineland	152·670	1886·390
Dantzic ..	127·690	1442·897	Riga ..	116·424	1256·215
Dresden ..	124·099	1382·463	Rome ..	137·358	1609·835
France ..	163·558	2091·743	Spain ..	123·832	1378·002
Geneva ..	369·024	7088·951	Sweden ..	136·515	1595·041
Hanover ..	131·194	1502·696	Venice ..	187·142	2560·102
Leipsig ..	123·432	1371·329	Vienna ..	155·002	1929·774

RELATIVE VALUE OF BRITISH AND FOREIGN ROAD MEASURES.

(*The English Mile being* 1760 *Yards long.*)

Country or Place.	Name of Measure.	English Yards.	No. of each equal to 100 English Miles.
Denmark	Mile..	8244	21·348
Flanders	League	6864	25·641
France	League of 2000 Toises ..	4263	41·285
Germany	Mile, long	10126	17·381
Hamburg	Mile..	8244	21·348
Hanover	Mile..	11559	15·226
Holland	Mile..	8103	21·725
Hungary	Mile..	9113	19·313
Netherlands	Mile, Metrical	1093	161·024
Poland	Mile, Long	8103	21·725
Portugal	League	6760	26·035
Prussia	Mile..	8237	21·367
Russia	Verst	1067	150·814
Spain	League, Common	7416	23·732
Sweden	Mile..	11700	15·042
Switzerland	Mile..	9153	19·228
Turkey	Berri	1826	96·385

GENERAL TABLES AND MEMORANDA.

BRICKLAYER.

1 cubic yard of clay will make about 450 bricks.
Stock bricks measure $8\frac{3}{4} \times 4\frac{1}{4} \times 2\frac{3}{4}$.
Paving bricks „ $9 \times 4\frac{1}{2} \times 1\frac{3}{4}$.
Dutch clinkers „ $6\frac{1}{4} \times 3 \times 1\frac{1}{2}$.
450 stock bricks weigh 1 ton.
1 rod of brickwork weighs 13 tons and contains 4350 bricks, 1 yard lime, 3 yards sand.

500 bricks
22 bushels sand, lime, &c.
36 hods, do.
27 feet cubic do.
} = 1 load.

54 feet cubic = 1 double load.

Bricklayers' Hod

Measures 16″ × 9″ × 9″.
Will hold 20 bricks.
„ $\frac{1}{2}$-bushel mortar nearly.

One Rod of Brickwork

= 272 feet super., $1\frac{1}{2}$ brick thick.
= 408 „ 1 „
= 204 „ 2 „
= 163 „ $2\frac{1}{2}$ „
= 136 „ 3 „
= 306 feet cubic, or $11\frac{1}{3}$ cubic yards.

One Rod of Brickwork contains:—

If laid dry in wells, &c. (about) 4900
„ walls, „ 5370 } Stocks.
If laid in mortar, „ 4350

One Superficial Foot of Reduced Brickwork contains:—

„ „ „ „ 16 bricks.
„ „ facing .. .. 7 „
„ „ gauged arches .. .. .. 10 „

One Yard of Bricknogging on Edge contains:—

„ „ „ 30 stocks.
„ „ laid flat .. .. .. 45 „

One Yard of Paving contains:—

Stock bricks laid flat 36
„ on edge 52
Paving bricks laid flat 36
„ on edge 82
Dutch clinkers laid flat 120
„ on edge 140

TILING.

A plain tile is $10\frac{1}{2}''$ long, and $6\frac{1}{2}''$ wide.
A pantile $13\frac{1}{2}''$ „ $9\frac{1}{2}''$ „
1000 tiles = 1 load.
1000 plain tiles weigh $22\frac{1}{4}$ cwts.
1000 pantiles „ 47 „
A plain tile lath is $1\frac{1}{4}''$ wide, and $\frac{1}{4}''$ thick.
A pantile „ $1\frac{1}{2}''$ „ $1''$ „
12 pantile laths 10 feet long = 1 bundle.
100 plain tile laths 5 feet long
125 „ „ 4 „
167 „ „ 3 „
500 feet „ any length
} 1 bundle.
30 bundles plain tile laths = 1 load.
Lathwood 6 feet long and 6 feet high = 1 fathom.

One Square of Tiling contains:—
600 plain tiles laid to a 4″ gauge.
700 „ „ $3\frac{1}{2}$ „
800 „ „ 3 „
150 pantiles „ 12 „
164 „ „ 11 „
180 „ „ 10 „

One Square of Plain Tiles requires:—
1 bundle laths and nails.
1 peck tile-pins.
3 hods mortar.

One Square Pantiling requires:—
1 bundle laths and nails.
$1\frac{1}{4}$ hundred nails.

One square plain tiles weighs $14\frac{1}{2}$ cwt.
„ pantiles „ $7\frac{1}{2}$ „

SLATER.

1 square of slating = 100 feet superficial.
1200 slates = a thousand.
120 „ = a hundred.
For numbers of slates required see pp. 39 and 392.

Description.	Size.	Weight per M.
Doubles	13 × 6	15 cwt.
Ladies	15 × 8	$1\frac{1}{4}$ tons.
Countesses ..	20 × 10	2 „
Duchesses ..	24 × 12	3 „

The foregoing are sold by the thousand; the following, which are seldom used, by the ton. They vary in size, but are generally about
Imperials .. .. .. 30 × 24
Rags and Queens .. 36 × 24

To ascertain the number of slates required to cover a given area of roofing, take from the length of a slate the *lap* (that is as much as the third slate covers the first), divide the remainder by two, and multiply the quotient by the width of the slate, and the product will be the number of square inches covered by a single slate. By dividing the total area in feet of the surface required to be covered by this, and multiplying by 144 (the square inches in a foot), the result will give the number required.

CARPENTER.

One Load contains :—

40 cubic feet of unhewn timber.
50 „ squared „
600 superficial feet of 1″ deal.
400 „ „ $1\frac{1}{2}$ „
300 „ „ 2 „
240 „ „ $2\frac{1}{2}$ „
200 „ „ 3 „
170 „ „ $3\frac{1}{2}$ „
150 „ „ 4 „

66 cubic feet of deal
65 „ fir
60 „ elm
51 „ beech } = 1 ton.
45 „ ash
39 „ oak
34 „ mahogany

Battens are 7 inches wide.
Deals „ 9 „
Planks „ 11 „

Hoop Iron.

410 feet run hoop iron $1\frac{1}{4}$ in. wide, No. 16 Birmingham Wire Gauge .. .. .. } = 1 cwt.
576 feet run hoop iron $1\frac{1}{4}$ in. × $\frac{1}{16}$ in. .. .. = 1 „
360 „ „ do. $1\frac{1}{2}$ in. × $\frac{1}{16}$ in. .. .. = 1 „
A bundle of hoop iron $1\frac{1}{2}$ in. × $\frac{1}{16}$ in. contains 180 feet and weighs .. .. .. } = $\frac{1}{2}$ „

TABLE OF THE STANDARDS ADOPTED BY TIMBER MERCHANTS.

STANDARD.				HUNDRED.				
Name of Standard.	Standard.	Superficial area of 1″	Superficial area of 1½″	Hundred.	Superficial area of 1″	Superficial area of 1½″	Cubical Contents.	Relative Values.
Christiana	′ ″ 11 0 } ″ 9 } 1½	′ 10 5/16	′ 8½	′ ″ 120/ 11 0 } ″ 9 } 1½ or 60/ 15 0 } 11 } 1½	′ 1237½	′ 990	′ 103⅛	
Drammen	9 0 } 6½ } 2½	12 3/10	9½	120/ 9 0 } 6½ } 2½ or 120/ 13 0 } 9 } 1½ or 60/ 18 0 } 6½ } 2½	1462½	1170	121⅞	1 3/11 of C. Standard.
Petersburg	12 0 } 11 } 1½	16½	″ 1½ 11	120/ 12 0 } 11 } 1½ or 60/ 12 0 } 11 } 3	1980	″ 3 660	165	1½ of C. Standard.
Quebec	12 0 } 11 } 2½	27½	″ 3 9⅙	100/ 12 0 } 11 } 2½ or 100/ 10 0 } 11 } 3 120/ 10 0 } 11 } 3	2750	916⅔	229⅙	2½ of C. Standard.

= A long hundred.

One Square of Flooring contains:—

100 superficial feet,

and requires

If laid rough	$12\frac{1}{4}$	12 feet deals.
„ edges shot	$12\frac{1}{2}$	
„ wrought and folding	$13\frac{1}{2}$	
„ wrought, ploughed, and tongued	14	
If laid rough	16	12 feet battens.
„ edges shot	$16\frac{1}{2}$	
„ wrought and folding	17	
„ wrought, ploughed, and tongued	18	

SMITH AND FOUNDER.

Several of the following Tables are taken from the valuable little handbook on the weights of iron, by SAMUEL PENN:—

SHEET IRON.

WEIGHT OF A SUPERFICIAL FOOT AS PER BIRMINGHAM WIRE GAUGE.

(*Penn.*)

No. of Gauge.	lb.	No. of Gauge.	lb.
1	12·55	14	3·23
2	11·25	15	2·97
3	10·45	16	2·62
4	9·55	17	2·19
5	8·66	18	1·92
6	8·34	19	1·7
7	7·5	20	1·41
8	6·64	21	1·32
9	6·29	22	1·15
10	5·5	23	·99
11	4·73	24	·95
12	4·3	25	·84
13	3·64	26	·78

(*Penn.*)

THE WEIGHT OF ONE LINEAL FOOT OF FLAT IRON CLOSELY HAMMERED, IN POUNDS.

Breadth.	Parts of an inch in thickness.						
	¼	⅜	½	⅝	¾	⅞	inch.
inches.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
1	0·83	1·25	1·66	2·05	2·50	2·91	3·33
1⅛	0·93	1·4	1·87	2·34	2·81	3·28	3·75
1¼	1·04	1·56	2·08	2·60	3·12	3·64	4·16
1⅜	1·14	1·71	2·29	2·86	3·40	4·01	4·58
1½	1·25	1·87	2·52	3·12	3·75	4·37	5·0
1¾	1·45	2·18	2·91	3·64	4·37	5·10	5·83
2	1·66	2·5	3·33	4·16	5·00	5·83	6·66
2¼	1·87	2·81	3·75	4·68	5·62	6·56	7·50
2½	2·08	3·12	4·16	5·20	6·25	7·29	8·33
2¾	2·29	3·43	4·58	5·72	6·87	8·02	9·16
3	2·5	3·75	5·0	6·25	7·50	8·75	10·0
3¼	2·7	4·06	5·41	6·77	8·12	9·47	10·83
3½	2·91	4·37	5·83	7·29	8·75	10·20	11·66
3¾	3·11	4·68	6·25	7·80	9·37	10·93	12·50
4	3·33	5·0	6·66	8·32	10·0	11·66	13·33
4¼	3·53	5·31	7·08	8·85	10·62	12·39	14·16
4½	3·74	5·62	7·5	9·36	11·25	13·12	15·0
4¾	3·95	5·93	7·91	9·88	11·87	13·85	15·83
5	4·16	6·25	8·32	10·04	12·5	14·58	16·66
5¼	4·37	6·55	8·75	10·92	13·12	15·31	17·49
5½	4·58	6·86	9·16	11·45	13·75	16·04	18·32
5¾	4·79	7·18	9·58	11·97	14·37	16·77	19·16
6	5·2	7·5	10·0	12·5	15·0	17·5	20·0

(*Penn.*)

SQUARE AND ROUND IRON, WEIGHT PER LINEAL FOOT

Size in inches.	Square.		Diameter in inches.	Round.	
	Wrought.	Cast.		Wrought.	Cast.
	lb.	lb.		lb.	lb.
¼	0·208	0·20	¼	0·163	0·15
⅜	0·468	0·44	⅜	0·368	0·34
½	0·833	0·78	½	0·654	0·61
⅝	1·30	1·22	⅝	1·02	0·95
¾	1·87	1·75	¾	1·47	1·38
⅞	2·55	2·39	⅞	2·00	1·87
1	3·33	3·12	1	2·61	2·45
1⅛	4·21	3·95	1⅛	3·31	3·10
1¼	5·20	4·88	1¼	4·09	3·83
1⅜	6·30	5·90	1⅜	4·94	4·64
1½	7·50	7·03	1½	5·89	5·52
1⅝	8·80	8·25	1⅝	6·91	6·48
1¾	10·20	9·57	1¾	8·01	7·51
1⅞	11·71	10·98	1⅞	9·20	8·62
2	13·33	12·50	2	10·47	9·81
2⅛	15·05	14·11	2⅛	11·82	..
2¼	16·87	..	2¼	13·25	..
2⅜	18·80	..	2⅜	14·76	..
2½	20·80	..	2½	16·36	..
2⅝	22·96	..	2⅝	18·03	..
2¾	25·20	..	2¾	19·79	..
2⅞	27·55	..	2⅞	21·63	..
3	30·00	..	3	23·56	..
3¼	35·20	..	3¼	27·65	..
3½	40·80	..	3½	32·07	..
3¾	46·87	..	3¾	36·81	..
4	53·33	..	4	41·88	..
4¼	60·20	..	4¼	47·28	..
4½	67·50	..	4½	53·01	..
4¾	75·20	..	4¾	59·06	..
5	83·33	..	5	65·45	..

TABLE OF THE WEIGHTS PER FOOT RUN, AND SECTIONAL AREAS OF EQUAL-SIDED ANGLE AND TEE IRONS.
The L and T Irons are taken as Uniformly Thick in each Part.

Thickness of section in inches and parts.	Thickness in parts of an inch.																	
	1/4		5/16		3/8		7/16		1/2		9/16		5/8		11/16		3/4	
	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.
1½	2·31	·69	2·82	·84	3·31	·99	3·77	1·12	4·20	1·26								
1⅝	2·52	·75	3·08	·92	3·62	1·08	4·14	1·20	4·62	1·38								
1¾	2·73	·81	3·35	1·00	3·94	1·18	4·51	1·35	5·04	1·51								
1⅞	2·94	·88	3·61	1·08	4·25	1·27	4·88	1·46	5·46	1·63								
2	3·15	·94	3·88	1·16	4·57	1·37	5·24	1·57	5·88	1·76	6·50	1·94	7·09	2·12	7·65	2·29	8·19	2·45
2¼	3·57	1·06	4·40	1·32	5·20	1·50	5·98	1·76	6·72	2·01	7·44	2·23	8·14	2·44	8·81	2·64	9·45	2·82
2½	3·99	1·19	4·92	1·47	5·83	1·74	6·71	2·00	7·56	2·26	8·39	2·52	9·19	2·75	9·96	2·93	10·71	3·15
2¾	4·41	1·32	5·45	1·63	6·46	1·93	7·45	2·23	8·40	2·51	9·33	2·79	10·24	3·07	11·12	3·33	11·97	3·58
3	4·83	1·44	5·97	1·78	7·09	2·12	8·18	2·44	9·24	2·77	10·28	3·08	11·29	3·38	12·27	3·67	13·23	3·96
3¼	5·25	1·57	6·50	1·94	7·72	2·31	8·92	2·67	10·08	3·02	11·22	3·36	12·34	3·69	13·43	4·02	14·49	4·34
3½	5·67	1·69	7·02	2·10	8·35	2·50	9·65	2·88	10·92	3·28	12·17	3·65	13·39	4·01	14·58	4·36	15·75	4·72
3¾	6·09	1·82	7·55	2·26	8·98	2·69	10·39	3·11	11·76	3·52	13·11	3·92	14·44	4·32	15·74	4·72	17·02	5·11
4	6·51	1·95	8·07	2·41	9·61	2·86	11·12	3·32	12·60	3·77	14·06	4·22	15·49	4·64	16·89	5·06	18·27	5·47
4¼	6·93	2·07	8·60	2·57	10·24	3·07	11·86	3·55	13·44	4·02	15·00	4·49	16·54	4·95	18·05	5·40	19·53	5·82
4½	7·35	2·20	9·12	2·73	10·97	3·25	12·59	3·77	14·28	4·28	15·95	4·78	17·59	5·27	19·20	5·75	20·79	6·22
4¾	7·77	2·33	9·65	2·89	11·50	3·44	13·32	3·98	15·12	4·53	16·89	5·06	18·64	5·58	20·36	6·09	22·05	6·60
5	8·19	2·45	10·17	3·04	12·13	3·63	14·06	4·20	15·96	4·77	17·84	5·34	19·69	5·89	21·51	6·44	23·31	6·98
5¼	8·61	2·58	10·69	3·20	12·76	3·82	14·80	4·43	16·80	5·03	18·78	5·62	20·74	6·21	22·67	6·78	24·57	7·35
5½	9·03	2·70	11·22	3·35	13·39	4·00	15·53	4·65	17·64	5·28	19·73	5·91	21·79	6·52	23·82	7·13	25·83	7·73
5¾	9·45	2·82	11·75	3·52	14·02	4·20	16·27	4·86	18·48	5·53	20·67	6·19	22·84	6·84	24·88	7·48	27·09	8·11
6	9·87	2·92	12·27	3·66	14·65	4·38	17·00	5·09	19·32	5·78	21·62	6·47	23·89	7·15	26·13	7·82	28·36	8·48

The weights are given in pounds and decimal parts; the sectional areas are given in inches and decimal parts.

(*Penn.*)

WEIGHT OF CAST-IRON PIPES, 12 INCHES LONG, FROM ¼" TO 1¼" THICK.

Diam. of bore.	¼	⅜	½	⅝	¾	⅞	1"	1⅛	1¼
1	3·06	5·06	7·36	9·97	12·89	16·11	19·63		
1¼	3·68	5·98	8·59	11·51	14·73	18·25	22·09		
1½	4·29	6·9	9·82	13·04	16·56	20·4	24·54	28·99	33·74
1¾	4·91	7·83	11·05	14·57	18·41	22·55	27·0	31·75	36·76
2	5·53	8·75	12·27	16·11	20·25	24·7	29·45	34·46	39·89
2¼	6·14	9·66	13·5	17·64	22·09	26·84	31·85	37·28	42·95
2½	6·74	10·58	14·72	19·17	23·92	28·93	34·36	40·03	46·02
2¾	7·36	11·5	15·95	20·7	25·71	31·14	36·81	42·8	49·08
3	7·98	12·43	17·18	22·19	27·62	33·29	39·28	45·56	52·16
3½	9·2	14·21	19·64	25·31	31·3	37·58	44·18	51·08	58·29
4	10·44	16·11	22·1	28·38	34·98	41·88	49·09	56·61	64·43
4½	11·66	17·94	24·54	31·44	38·65	46·17	53·99	62·12	70·56
5	12·88	19·78	26·99	34·51	42·33	50·46	58·9	67·94	76·69
5½	14·11	21·63	29·45	37·58	46·02	54·76	63·81	73·17	82·84
6	15·34	23·47	31·91	40·65	49·7	59·06	68·73	78·7	88·75
7	17·79	27·15	36·82	46·79	56·84	67·65	78·53	89·74	101·24
8	20·02	30·83	41·71	52·92	64·42	76·23	88·35	100·78	113·51
9	22·71	34·52	46·64	59·07	71·8	84·84	98·18	111·84	125·8
10	25·6	38·2	51·54	65·2	79·16	93·42	108	122·87	138·06
11	27·62	41·88	56·46	71·33	86·52	102·01	117·81	133·92	150·33
12	30·06	45·55	61·35	77·46	93·6	110·6	127·6	144·96	162·6

CORRUGATED IRON ROOFING.

B. W. Gauge.	Size of Sheets.	Weight per Square.
16	6 ft. × 2 ft. to 8 ft. × 3 ft.	3⅛ cwts.
18	" "	2¼ "
20	" "	1⅞ "
22	" "	1½ "
24	" "	1¼ "
26	" "	1 "

Water—

1 gallon weighs about 10 lb.
1 cubic foot contains $6\frac{1}{4}$ gallons.

TABLE SHOWING CONTENTS OF CISTERNS OF VARIOUS SIZES.

Contents.	Length.	Breadth.	Depth.
30 gallons.	2 feet 0 in.	1 foot 6 in.	1 foot 8 in.
40 „	2 „ 7 „	1 „ 6 „	1 „ 8 „
50 „	2 „ 7 „	1 „ 7 „	2 „ 0 „
60 „	2 „ 7 „	1 „ 9 „	2 „ 2 „
70 „	2 „ 10 „	1 „ 10 „	2 „ 2 „
80 „	3 „ 0 „	2 „ 0 „	2 „ 2 „
90 „	3 „ 0 „	2 „ 0 „	2 „ $5\frac{1}{2}$ „
100 „	3 „ 0 „	2 „ 2 „	2 „ 6 „
110 „	3 „ 3 „	2 „ 3 „	2 „ 6 „
120 „	3 „ 3 „	2 „ 4 „	2 „ 7 „
130 „	3 „ 4 „	2 „ 4 „	2 „ 9 „
140 „	3 „ 7 „	2 „ 4 „	2 „ 9 „
150 „	3 „ 7 „	2 „ 5 „	2 „ 10 „

PLASTERER.

1 cask Portland or Parian cement contains 4 bushels.
1 cask Roman cement contains 5 bushels.
1 sack Portland cement contains 2 bushels.
1 sack Roman cement contains 3 bushels.
1 bag plaster of Paris contains 14 lb.
1 sack plaster of Paris contains 2 cwt.
1 bag lime contains 2150 cub. inches.

1 bundle laths contains 500 feet run.
Single fir laths are $\frac{3}{16}$″ thick.
Lath and half, $\frac{1}{4}$″ thick.
Double laths, $\frac{3}{8}$″.

$1\frac{1}{4}$ yard lime
$2\frac{1}{2}$ yards sand
15 lb. hair
} will cover 100 yards *rendering* only.

$2\frac{1}{4}$ yard lime
$2\frac{1}{2}$ yard sand
18 lb. hair
} will cover 100 yards *render and set.*

$2\frac{1}{2}$ yards lime
$3\frac{1}{2}$ yards sand
21 lb. hair
} will cover 100 yards *render float and set.*

1 bushel cement and 1 bushel sand will cover $4\frac{1}{2}$ yards $\frac{1}{2}$″ thick.
1 bundle laths and 400 nails will cover 5 yards nearly.
2 bushels lime will do 100 yards of limewhiting.

PLUMBER.

Thickness of Lead.

Weight per foot super. in lb.	Thickness in inches.	Weight per foot super. in lb.	Thickness in inches.
4	·068	7	·118
5	·085	8	·135
6	·100	9	·152

Weight of Lead Pipes.

	Light.	Middling.	Strong.
½″ = 15 feet length	15 lb.	17 lb.	22 lb.
¾ „ „	24 „	28 „	32 „
1 „ „	36 „	42 „	50 „
1½ „ „	48 „	56 „	64 „
2 „ „	84 „	96 „	112 „

Weight of Zinc *per foot super.*

Gauge.	Weight.			Gauge.	Weight.		
	lb.	oz.	drms.		lb.	oz.	drms.
6	—	7	10	13	1	3	9
7	—	8	12	14	1	5	12
8	—	9	13	15	1	7	14
9	—	10	14	16	1	10	1
10	—	13	1	17	1	14	6
11	—	15	4	18	2	2	11
12	1	1	6				

PAINTER.

5 lb. white lead
5 lb. putty
1 quart oil
} will cover 45 yards of first coat.

5 lb. white lead
1 quart oil
} will cover 45 yards each succeeding coat

GLAZIER.

1 crate of crown glass contains—
12 tables of the best.
15 „ seconds.
18 „ thirds.
18 „ fourths.

Each table measuring from 48 to 54 inches diameter.

PAPERHANGER.

12 yards lineal = 1 *piece* of paper.
1 dozen border = 12 yards.

Paper is usually 20 inches wide.

To find the number of pieces of paper required to cover a room, divide the superficial area to be covered in feet, by 60 (the number of feet superficial in a piece).

French papers vary in length and breadth according to quality, but are generally from 9 to 9½ yards long, and from 18 to 18½ in. wide.

TABLES OF CONSTANTS.

The following "Tables of Constants," though far from perfect, may perhaps be found of service. In estimating one often is at a loss to know the time a certain piece of work will take a man to execute. By referring to the Tables, the number of hours an average skilled artisan may be expected to do it in can be readily ascertained; but, as different men vary in the time they take, according to their skill, it follows that the most carefully computed Tables can only be approximate. It is impossible to lay down abstract rules for every item, or indeed every trade, because they vary in nearly every job. This is most noticeable in the case of the Plumber, which has been entirely omitted here.

The subject of valuing quantities is not the least important with which the surveyor has to deal, but it is one that requires a very large amount of experience and knowledge, and the student must be proficient in it before he can become a competent surveyor.

In using the Tables, it is necessary to multiply the constant by the rate per hour of the workmen,* in order to find the price of the labour. To this must be added the cost of the material, and the total will give the estimated prime cost of the work.

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* If the workmen are paid at different rates take the average.

EXCAVATOR.

	Labourer.
Excavation only—at per yard cube:—	
Vegetable earth or loam	·5 hours.
Clay or heavy ground	1·0 „
Gravel or hard ground	1·5 „
Digging, Throwing into Barrows, and Wheeling—50 yards:—	
Earth	1·4 „
Gravel, clay, &c.	1·8 „
Filling in and Ramming about Foundations	·5 „
Clay Puddling—tempering and laying in layers 9 in. thick	6·50 „
Ditto ditto in layers 12 in. thick	5·50 „

BRICKLAYER.

Concrete.—Labour, mixing, wheeling, and depositing and ramming—per yard cube	2·30 „
Concrete.—Mixing, wheeling and spreading, and levelling in layers—9″ thick, at per yard super	0·80 „
Ditto ditto ditto 12″ thick	1·10 „
Ditto ditto ditto 18″ „	2·00 „

	Bricklayer and Labourer
Brickwork per rod	45·00 hours.
Ditto in walls 1 brick thick	51·32 „
Extra labour to selected facings—per ft. super.	·15 „
Axed arches „	·35 „
Gauged arches „	·80 „
Half-brick walls in cement „	·15 „
Tuck-pointing per yard super.	2·50 „
Bricknogging laid flat „	·68 „
„ on edge „	·66 „
Brick paving laid flat in sand	·43 „
„ on edge in sand	·65 „
„ laid flat in mortar	·70 „
„ on edge in mortar	·60 „
Paving with stock bricks laid flat in sand	·43 „
„ „ on edge in sand	·65 „
„ „ laid flat in mortar	·70 „
„ „ on edge in mortar	·86 „
4-inch drain pipe laid and jointed in cement, including junctions per foot run	·11 „
6 „ „ „ „	·16 „
9 „ „ „ „	·23 „
12 „ „ „ „	·31 „
18 „ „ „ „	·50 „
Pantiling laid dry per square	4·00 „
„ pointed outside „	6·40 „
„ pointed both sides „	8·80 „

		Bricklayer and Labourer.
Plain tiling laid to a 4″ gauge	per square	7·00 hours.
„ „ 3½″ gauge	„	7·20 „
„ „ 3″ gauge	„	7·40 „

MASON.

Labour on Portland or similar stone—per foot super	Mason.
Sawing	·60 hours.
Plain work in beds and joints	1·25 „
Sunk work	1·20 „
Plain faced, rubbed	1·25 „
Plain face, circular	1·55 „
Sunk work, rubbed	1·63 „
Sunk work, circular	1·75 „
Moulded work	2·00 „
Moulded work, circular	3·00 „
Circular work to shafts of columns	3·00 „
Circular circular work	4·70 „
The labour on Bath stone compared with Portland is about as 4 : 7.	
Labour, squaring, and laying 2″ or 2½″ York or Purbeck paving—per foot super	·14 „
Add—If in courses	·10 „
Labour, taking up, squaring, and relaying old paving—per foot super	·26 „
Add—If in courses	·12 „

SLATER.

		Slater and Labourer
Labour laying—only 2 nails each	per square	
Doubles	„	2·50 hours.
Ladies	„	1·50 „
Countesses	„	1·10 „
Duchesses	„	1·00 „
Preparing and laying—2 nails each		
Doubles	„	3·90 „
Ladies	„	2·60 „
Countesses	„	1·90 „
Duchess	„	1·55 „
Plastering against under side of slating	per sup. yard	·50 „

CARPENTER AND JOINER.

Fir in bond timbers (plates, lintels, and wood bricks)—per foot cube	Joiner. ·46 hours.
„ framed	1·00 „
„ „ in trusses	1·35 „
„ wrought and framed	2·28 „
„ „ framed, and rebated	2·54–3·80 „
„ „ „ rebated, and beaded	2·94–3·71 „
„ proper door cases	3·71 „
Planing fir—per foot super	·13 „
„ and squaring	·17 „

Centering—per square.

For plain cylindrical vaults or arches	15·50 hours.
„ groined arches	32·00 „
„ trimmer arches—per foot super	·55 „

ROUGH BOARDING—*per square* (in deal widths).

Thickness.	Rough.	Edges Shot.	Ploughed and Tongued.
	hours.	hours.	hours.
¾ inch	2·20	3·00	—
1 „	2·38	3·18	4·00
1¼ „	2·62	3·42	4·26
1½ „	2·90	3·70	4·56

FLOORING—*at per square.*

Floors of deal prepared and laid complete with straight joints and tongued headings.

Description.	In Deal Widths.					In Batten Widths.	
	¾″	1″	1¼″	1½″	2″	1″	1¼″
	hours.	hours.	hours.	hours.	hours.	hours.	hours.
Wrought	6·38	7·18	8·06	8·98	10·80	7·98	8·97
Ditto, rebated and filleted	9·68	10·93	12·28	13·25	14·40	—	12·83

Battening—per square (including plugging to wall).

¾ in. to 1¼ in. placed 12 in. from centre to centre ..	2·59 hours.

Weather Boarding—per square.

Rough	4·20 „
„ splayed edges	6·00 „
Wrought and beaded	8·20 „

Gutter Boards and Bearers—per foot super.

Inch or 1¼ in.	·24 „
Ditto to curb roof	·28 „

Skirtings (including backings, &c., fixed complete)—per foot super.

¾ in. square	·35 „
1 „	·40 „
1¼ „	·45 „

Add—If beaded or chamfered	·08	hours.
„ If torus moulded	·15	„
„ If otherwise moulded	·30	„
Grooving and tongueing per lineal foot	·08	„
Ditto ditto, cross grain	·15	„

Framed Grounds—per foot super.

¾ in. framed grounds	·55	„
1 in. ditto	·60	„
1¼ in. ditto	·65	„
1½ in. ditto	·74	„

Framed Partitions—per foot super.

1½ in. square framed	·50	„
Add—If 1½ in. moulded one side	·10	„
„ „ „ both sides	·20	„
2 in. square framed	·50	„
Add—If moulded one side	·12	„
„ „ both sides	·24	„

Sashes and Frames—per foot super.

Deal cased frames, oak sunk sill, deal pulley stiles, &c., complete for 1½ in. sashes, single hung	·65	„
Ditto, ditto, for 2 in. sashes	·76	„
Ditto, ditto, for 2½ in. sashes	·86	„
Add—If prepared with wainscot or mahogany pulley stiles and slips	·08	„
„ If double hung	·12	„
1½ in. deal ovolo sashes	·50	„
1½ in. wainscot or mahogany ditto	·70	„
2 in. deal ditto	·60	„
2 in. wainscot or mahogany ditto	·85	„
Add—If astragal and hollow in deal	·13	„
„ If astragal and hollow in wainscot or mahogany	·21	„
Take curved heads as twice that of straight.		
Circular on plan, ditto.		

French Casements, per foot super.

1½ inch deal ovolo	·50	„
2 inch ditto	·60	„
2½ inch ditto	·64	„
1½ inch wainscot or mahogany	·70	„
2 and 2½ inch ditto	·75	„
Add—To deal casements if with marginal lights	·16	„
„ To mahogany ditto ditto	·28	„

Window Linings, per foot super.

Inch deal two-panel square framed back linings	·95	„
„ bead-butt or moulded	1·07	„
„ bead flush or quirk moulded	1·13	„
Add—For each panel above two, if square	·18	„
„ For each panel if moulded	·24	„
„ If splayed linings	·07	„

Window Backs, Elbows, and Soffits, per foot super.

Inch deal, plain keyed, or two panel square backs	·70	hours
Ditto two panel square backs, elbows and soffits ..	·75	„
Add—For each panel above three	·09	„
If bead-butt or moulded	·10	„
If bead flush or quirk moulded	·18	„

Boxings to Windows, per foot super.

Deal framed rebated and beaded boxings	·90	„
Splayed ditto ditto	1·09	„

Shutters, per foot super.

¾ inch deal clamped flaps in one height	·95	„
Inch ditto, two panel square framed in one height	1·00	„
Add—For every panel above two—		
If square framed	·20	„
If bead-butt or moulded on one side	·18	„
If bead flush	·22	„
If hung in two heights	·12	„

Doors, per foot super.

1¼ inch deal ledged door, rough edges shot	·22	„
Add—If ploughed and tongued	·47	„
If wrought both sides	·24–·39	„
If braced	·05	„
If hung folding	·21	„

Framed Doors, 2 panels, per foot super.

If square framed, 1¼ inch	·63	„
„ „ 1½ inch	·69	„
„ „ 2 inch	·80	„
„ „ 2½ inch	·92	„
If flush one side or bead butt, 1¼ inch framing ..	·71	„
„ „ 1½ „ ..	·77	„
„ „ 2 „ ..	·90	„
„ „ 2½ „ ..	1·03	„
Flush both sides or bead butt, 1¼ inch framing ..	·85	„
„ „ 2 „ ..	·99	„
„ „ 2½ „ ..	1·14	„
Add to each if moulded—		
If framing, 1¼ inch	·10	„
„ 1½ „	·11	„
„ 2 „	·13	„
„ 2½ „	·14	„

Framed Doors, 4 panels, per foot super.

If square framed, 1¼ inch	·70	„
„ „ 1½ „	·77	„
„ „ 2 „	·89	„
„ „ 2½ „	1·02	„
If flush one side or bead-butt, 1¼ inch framing ..	·79	„
„ „ 1½ „ ..	·86	„
„ „ 2 „ ..	1·00	„
„ „ 2½ „ ..	1·14	„

Flush both sides or bead butt, 1½ inch framing ..	·95	hours.
„ „ 2 „ ..	1·11	„
„ „ 2½ „ ..	1·26	„
Add to each face if moulded—		
If framing, 1¼ inch	·11	„
„ 1½ „	·11	„
„ 2 „	·14	„
„ 2½ „	·16	„
Add—If bead flush and square, 1½ inch	·26	„
„ „ 2 „	·36	„
„ „ 2½ „	·42	„
If moulded, 1½ inch	·20	„
„ 2 „	·24	„
„ 2½ „	·26	„
If double margins	·25	„
If hung folding	·15	„

Door Linings, per foot super.

¾″ square	·18	„
1″ square	·20	„
1″ single rebated	·28	„
1″ double rebated	·36	„
1″ single rebated framed square and flat, and 1 or two panels in height	·64	„
1″ ditto ditto, but 3 to 4 panels high	·72	„
1¼″ square	·23	„
1¼″ single rebated	·30	„
1¼″ double rebated	·38	„
1¼″ single rebated framed square and flat, and 1 or 2 panels in height	·70	„
1¼″ ditto ditto, but 3 to 4 panels high	·75	„
Add—If moulded to 1 or 2 panels	·11	„
„ 3 or 4 panels	·13	„
2″ square	·30	„
2″ single rebated	·39	„
2″ double rebated	·48	„
2″ single rebated framed square and flat, and 1 or 2 panels in height	·89	„
2″ single rebated framed square and flat, and 3 or 4 panels in height	·99	„
Add—If moulded to 1 or 2 panels	·14	„
„ 3 or 4 panels	·18	„
2½″ square	·36	„
2½″ single rebated	·46	„
2½″ double rebated	·55	„
2½″ single rebated framed square and flat, and 1 or 2 panels in height	1·02	„
2½″ ditto ditto, but 3 or 4 panels in height	1·13	„
Add—If moulded to 1 or 2 panels	·16	„
„ 3 or 4 panels	·18	„

Staircases, per foot super (including fixing on carriages and brackets).

Description.	Thickness of Treads.			
	1 in.	1¼ in.	1½ in.	2 in.
	hours.	hours.	hours.	hours.
Rough, with edges shot	·29	·33	·37	·45
Wrought, with rounded nosings	·54	·60	·66	·78
Wrought, glued, and blocked, with rounded nosings	·61	·68	·75	·88
Wrought, glued, and blocked, with rounded nosings and moulded	·70	·78	·85	·98
Add—If risers be tongued into the treads on one edge	·06	·07	·08	·09

Outside Strings.

1¼" plain wrought, per foot super	·40	hours.
1½" „ „	·45	„
2" „ „	·50	„

	To 1¼ in.	To 1½ in.	To 2 in.	
Add—If sunk	·25	·27	·30	„
If moulded	·13	·14	·15	„
If cut for steps and risers	·21	·22	·24	„
If cut for steps and risers and mitred	·60	·63	·66	„

Wreathed or circular strings are to be taken as 4 times the rate of straight.

Wall Strings, at per foot super.

Plain and plugged, 1¼"	·50	hours.
„ 1½"	·55	„
„ 2"	·62	„
If moulded, add	·18	„

Handrails—per foot run.

Plain 3" × 3"	·50	„
Moulded	from ·75	„
Add for ramps	„ ·42	„
„ wreaths	„ 10·00	„

Labour on mahogany handrails = 1½ times that of deal.

Bar Balusters—per foot run.

1" × 1"	·17	„
1¼" × 1¼"	·19	„
„ dovetailed	·08	„
Dovetails in steps for balusters—each	·25	„
Iron balusters—fixing	·50	„

Dados—per foot super.

Proper dado, with dovetailed keys, joints secured with slips, &c. &c.	·70	hours.
Add—If raking, scribed to steps	·19	„
If to moulded nosings	·20	„
If base grooved into floor	·09	„
If circular on plan, twice the straight		

Pilasters and Columns—per foot super.

$1\frac{1}{4}$″ deal plain pilasters, glued and blocked ..	·94	„
„ diminished shaft	1·30	„
$1\frac{1}{4}$″ „ „ columns, glued and blocked	4·00	„
Add—If arris or fluting to pilasters—1″ wide ..	·20	„
„ „ „ 2″ ..	·25	„
„ „ „ 3″ ..	·40	„
If to columns .. .. 1″ ..	·25	„
„ .. .. 2″ ..	·35	„
„ .. .. 3″ ..	·50	„

PLASTERER.

	Plasterer, Labourer and boy	
Rendering—per yard super.	·18	hours.
„ curved	·23	„
„ and setting with fine stuff	·32	„
„ „ curved	·37	„
„ floating and setting	·42	„
„ „ „ curved	·52	„
Lathing	·18	„
„ curved	·25	„
Rendering with cement and sand	·40	„
„ „ „ „ curved ..	·53	„
Rough casting with lime and gravel	·15	„
„ „ „ „ curved ..	·19	„
Mouldings and cornices, in plaster—per foot super	·40	„
Limewhiting, colouring, ditto—per yard super	·05	„

PAINTER

Painting in common colours.

First or priming coat on wood—per yard super	·16	hours.
Second and following coats, each „ „ „	·14	„
First coat on iron .. .. .. „ „ „	·25	„
Second and following coats, each „ „ „	·16	„
Sash squares, each side, first coat—per doz. squares	·50	„
Ditto ditto second coat—per doz. squares ..	·40	„

Glazing.

Crown glass stopped into new sashes—per ft. sup.	·19	hours
Do. do., into old, do.	·60	„
Sheet glass in large squares stopped into new sashes		
,, per ft. sup.	·15	„
Do. do. old sashes, do.	·40	„
Cleaning windows, both sides, do.	·03	„

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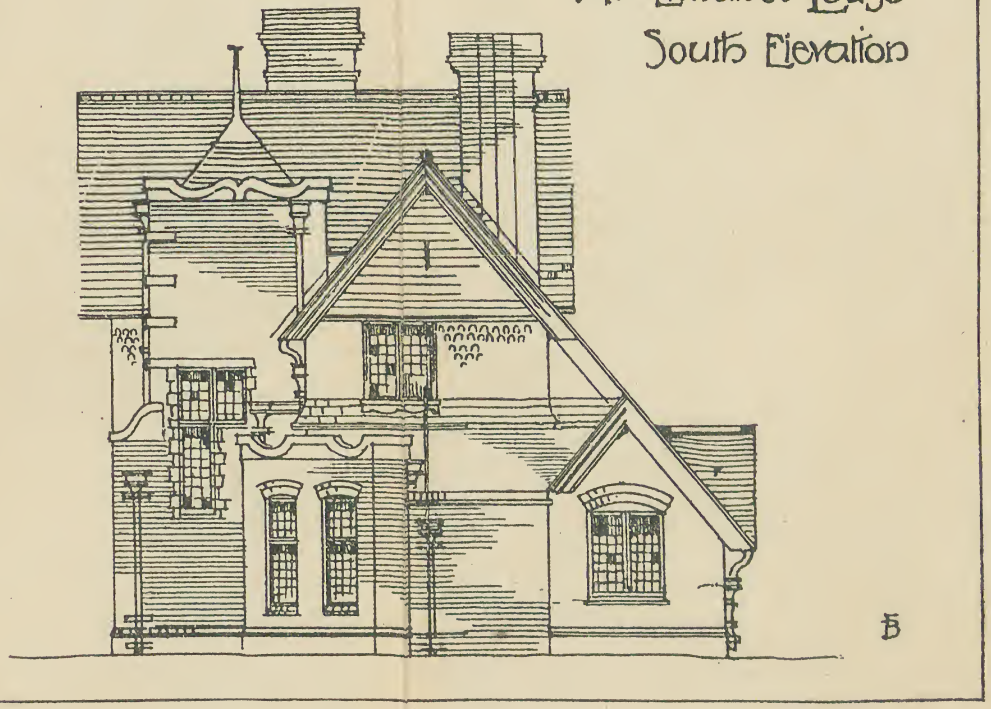

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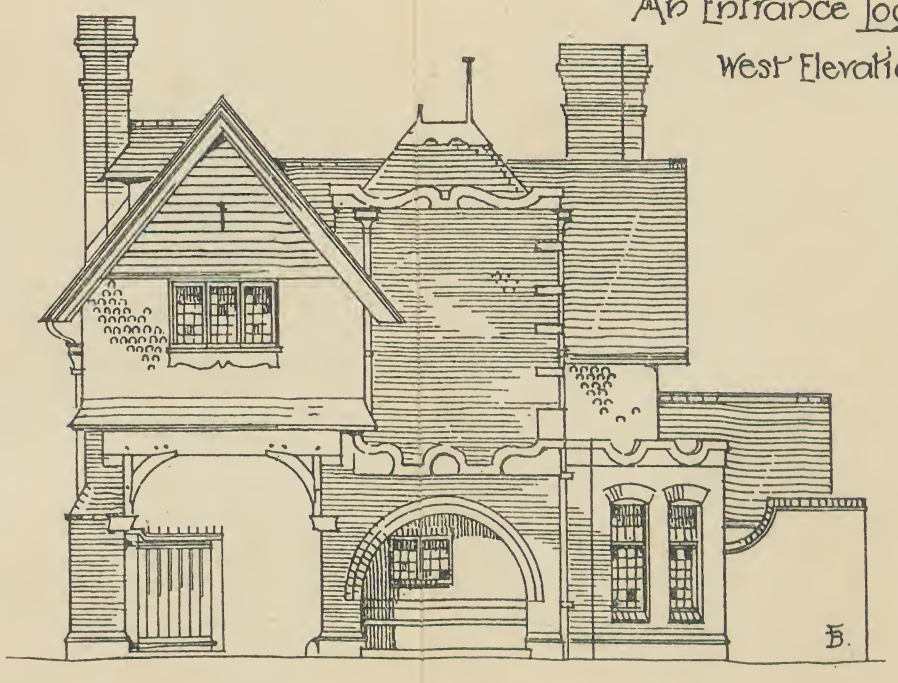

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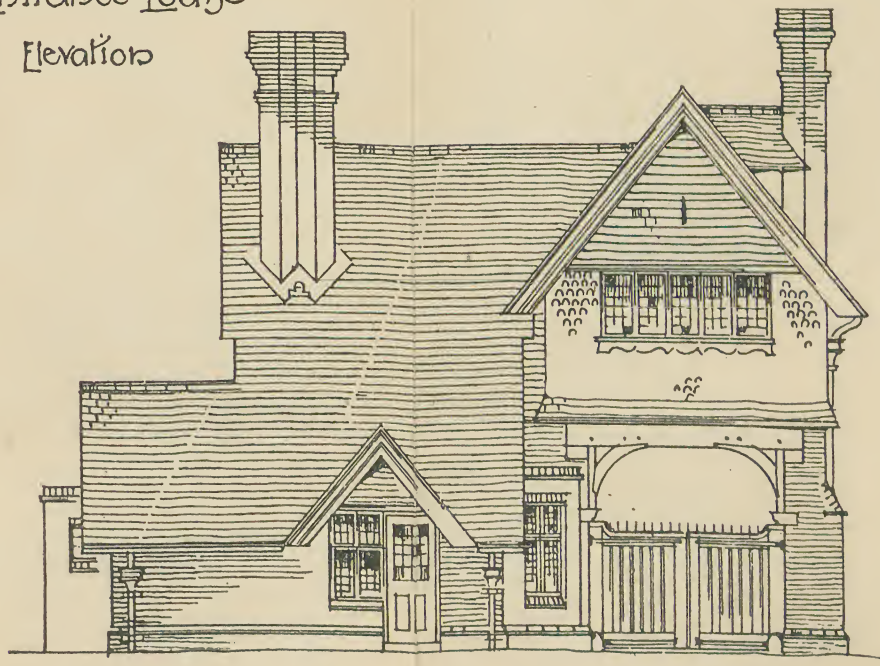

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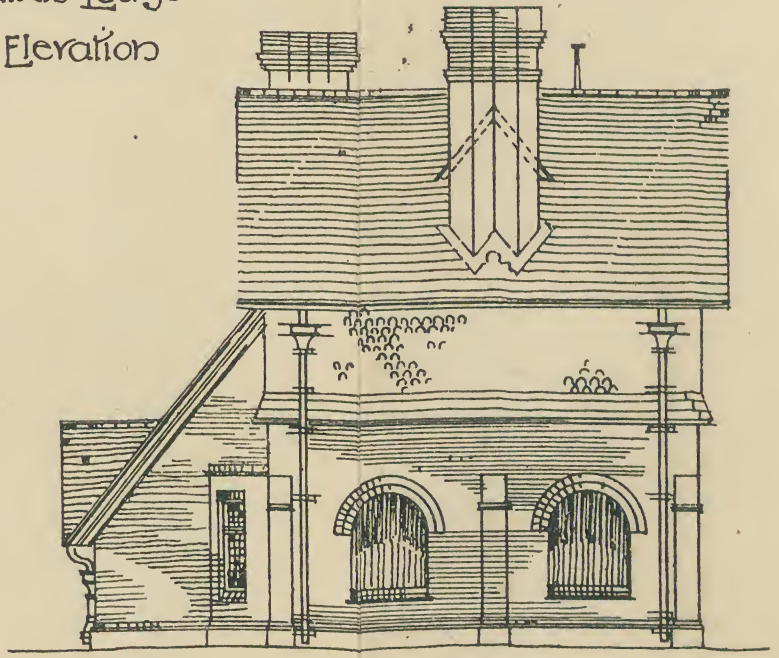

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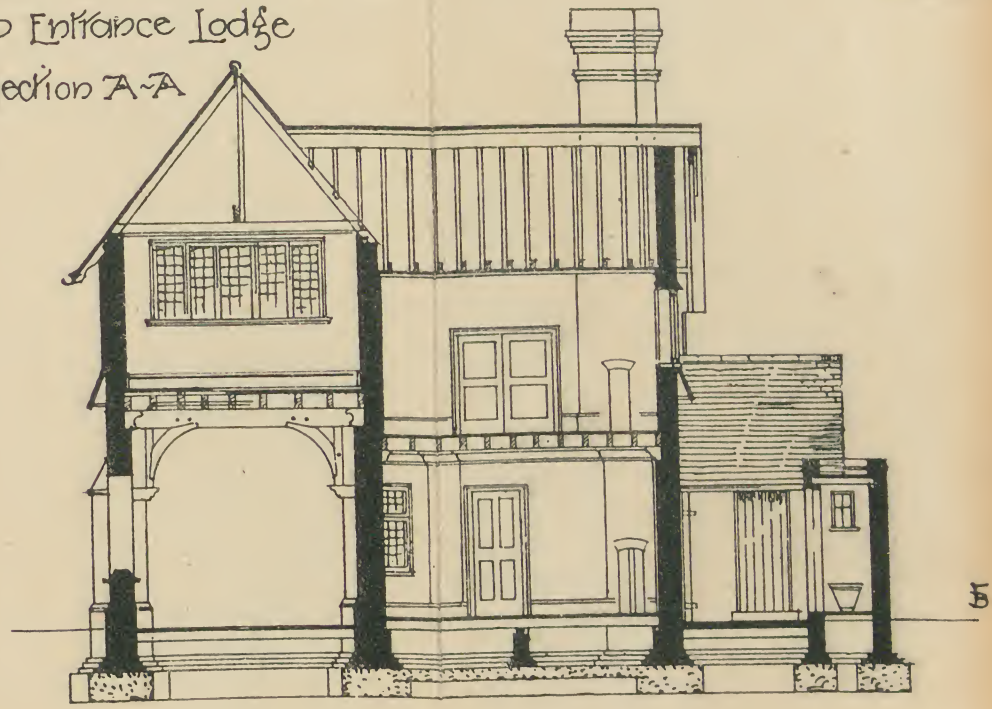

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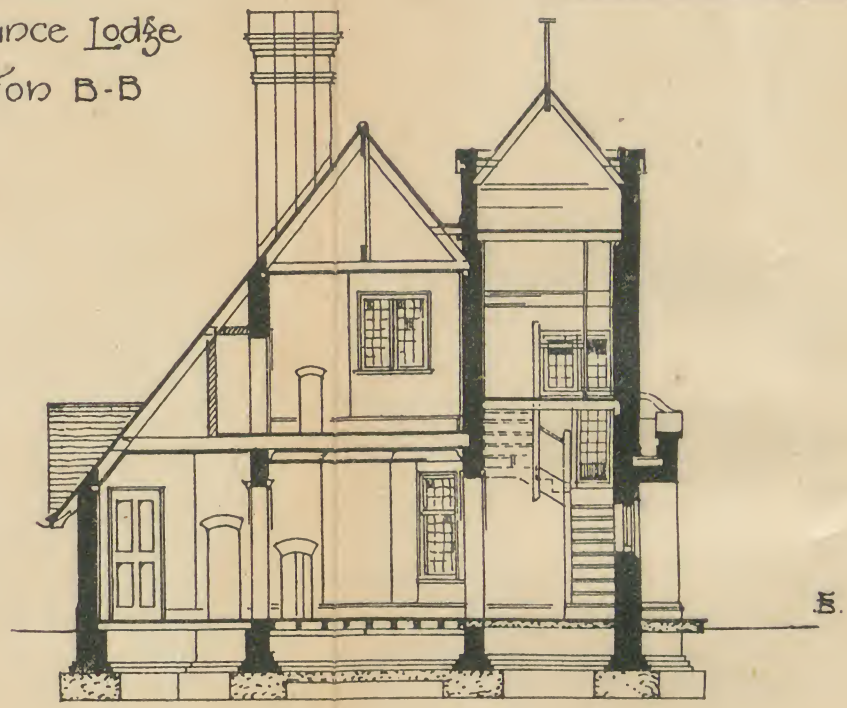

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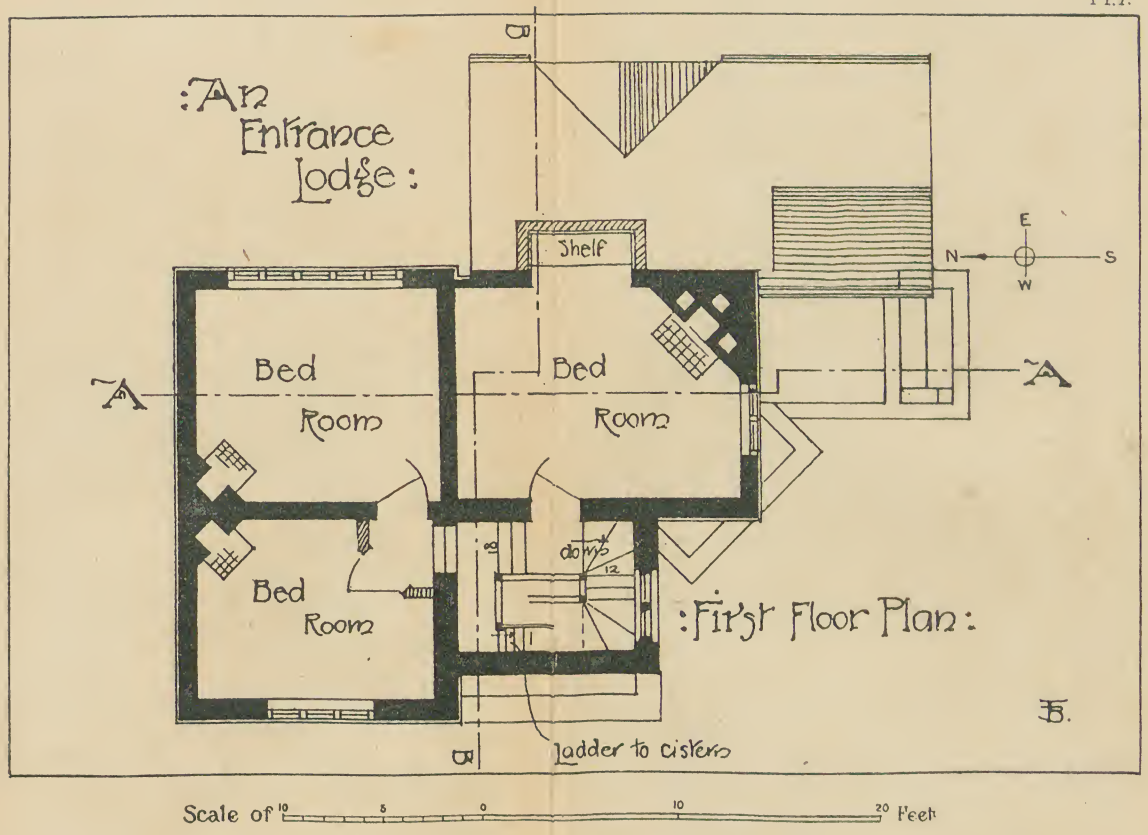
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Bed Room
Bed Room
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12
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A
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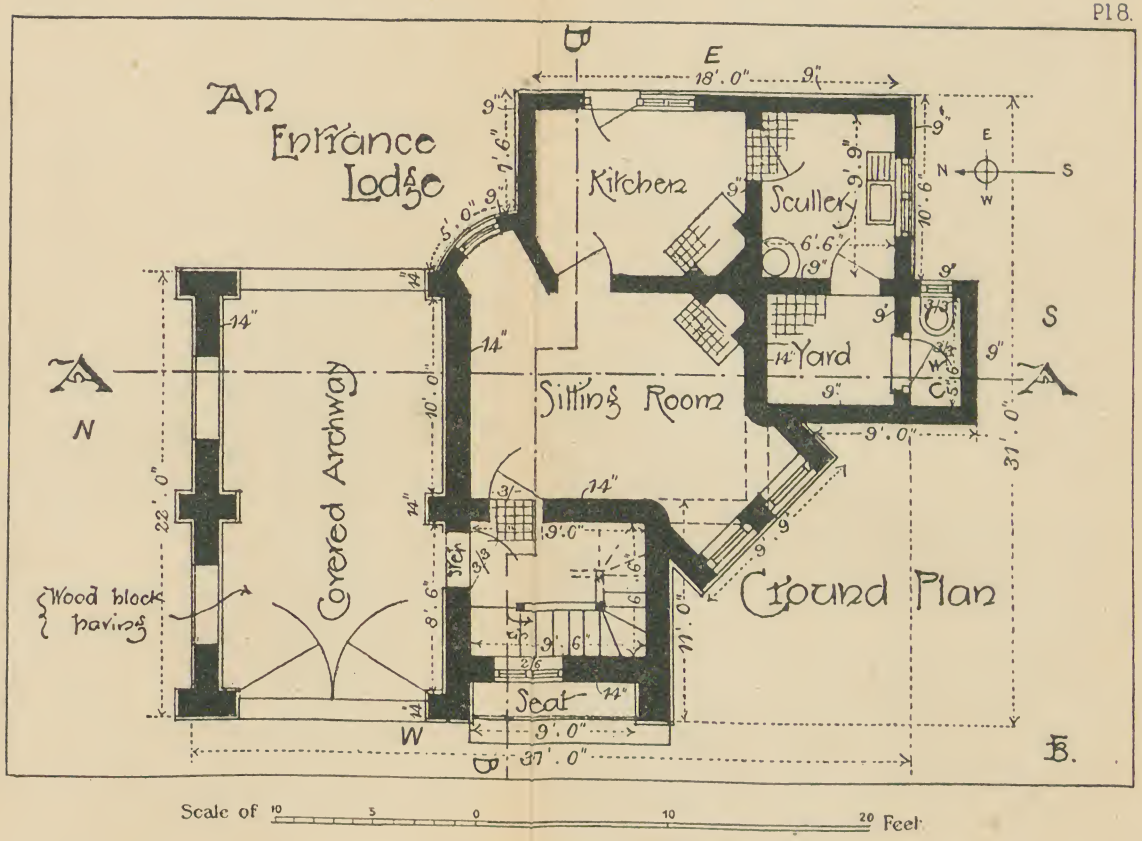

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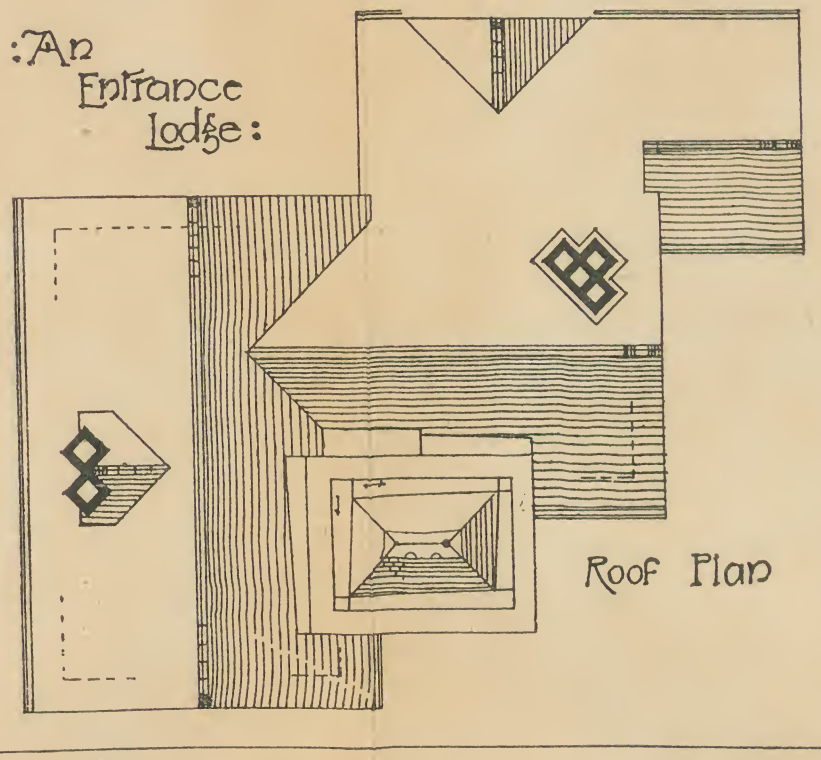

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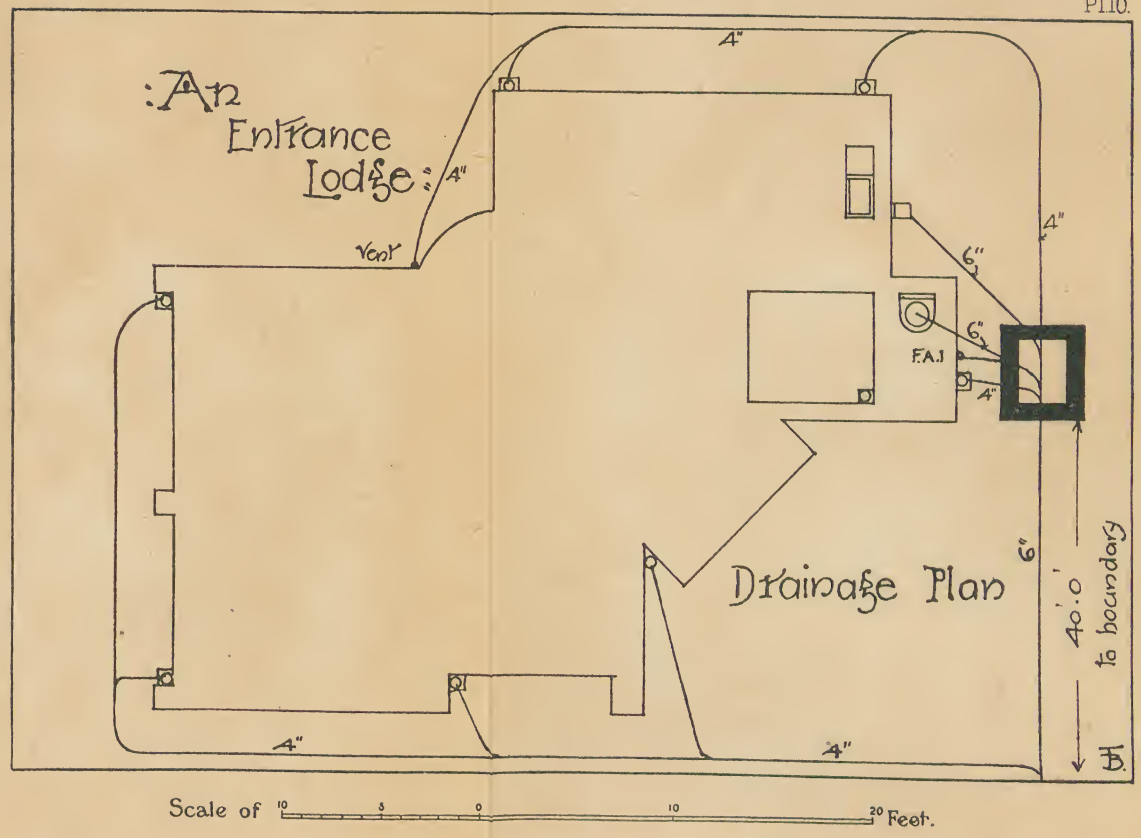
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